Contractors and Engineers

OCTOBER 1953

Current Alaskan Construction

TUNNEL STIFFS — Superintendent Al Aiken, at left, and two of his men escort unwelcome visitor from tunnel being drilled for hydroelectric power project in Alaska.

How Concrete of Required Workability Can Be Obtained Most Economically

As every concrete man knows, obtaining increased workability by adding water has two serious disadvantages. First, it increases the cost of the concrete because more cement is required to maintain strength. Second, it lowers the quality of the concrete because it increases shrinkage and permeability and decreases durability.

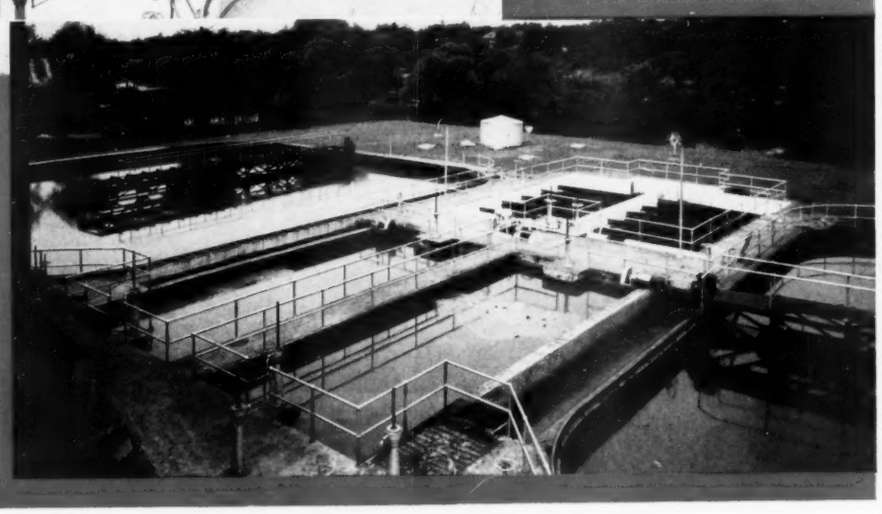
Experience on thousands of jobs has proved that the best and most economical way to obtain required workability is with Pozzolith.* When Pozzolith is added to a plain mix, slump is increased 150% or more.

For equal slump, approximately one gallon (15%) less water per sack of cement is required for a Pozzolith mix. Materials cost is lower . . . plasticity is improved . . . less time is required for placing and finishing.

In addition to producing required workability most economically, Pozzolith reduces shrinkage, lowers permeability and increases durability, because it lowers *unit water content* (water required per cubic yard of concrete.)

*Pozzolith . . . the cement-dispersing, water-reducing agent which makes available the optimum amount of air in concrete and fully complies with the water-cement ratio law. Can be added to the mix as a powder or dissolved in water and dispensed as a liquid. Pozzolith was developed by The Master Builders Company in 1932.

1936



1953

Upper And Lower Photos Show New Brunswick, N. J. Sewage Treatment Plant Just After Construction And Now.

17 YEARS' SERVICE PROVES ECONOMY OF POZZOLITH CONCRETE

"Your cement-dispersing agent, Pozzolith, has done a good job at our plant" writes S. Seid, Supervisor, City of New Brunswick, N. J., Dept. of Public Works.

Inspection reports from many plants like this show that after 15 and 20 years of service, Pozzolith Concrete is free of scaling and other disintegration, even at the water line.

In addition to producing great durability, Pozzolith provides concrete with reduced permeability — *at lower cost than by any other means.* This is because Pozzolith disperses cement, reduces unit water content — water required per cubic yard of concrete — and entrains the optimum amount of air.

Full information on Pozzolith and "see-for-yourself" demonstration kit supplied on request . . . without cost or obligation.

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

"IRON-CLAD" CONCRETE FLOORS FOR HEAVY TRAFFIC AREAS

The Masterplate "iron-clad" concrete floor is 4-6 times more wear-resistant than the best plain concrete floor, also, corrosion-resistant, spark-safe, easy-to-clean, non-slip, non-dusting and economical. Non-colored and colored.

Section of Masterplate Floor. Note thickness of iron-armored surface.

Only with Masterplate can a Masterplate "iron-armored" concrete floor with all its important service advantages be obtained, because only Masterplate contains the cement-dispersing agent calcium lignosulfonate which makes it possible to easily float a pound or more of the tough, ductile metal on fresh concrete and *keep it at the surface.*

Full information on Masterplate — for new floors and resurfacing old concrete floors — and "see-for-yourself" demonstration kit supplied on request by the manufacturer, The Master Builders Co., Cleveland 3, Ohio.

COLORED CONCRETE FLOORS FOR LIGHT TRAFFIC AREAS

Colorcron is being widely used by contractors to obtain uniformly colored, long wearing concrete floors for show rooms, churches, schools, apartments and offices; also for recreation rooms, patios, driveways, sidewalks, breezeways and garages. Floors can be scored to any desired pattern.

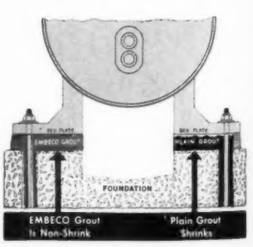
Color Plus Long Wear

Colorcron floors cost less additional than painting the floor, outwear the best plain concrete floor, and have more uniform and more intense color than is obtained from the use of pigments put in the mix. Colors: light grey, dark grey, red, brown, black, green, dark green, also non-colored.

Full directions for the use of Colorcron may be obtained from the manufacturer, The Master Builders Co., Cleveland 3, Ohio.

FOR NON-SHRINK GROUTING

To avoid shrinkage—principal cause of failure in equipment grouts—plant engineers use Embeco metallic aggregate, the material that produces a non-shrink flowable grout.



Cross-section shows how an easily placeable, flowable Embeco Grout counteracts shrinkage to produce full contact with bedplate.

Following are a few of the many other uses of Embeco non-shrink mortar: grouting anchor bolts; grouting steel floor grids; grouting around pipes through walls; caulking bell and spigot pipe; patching floors, ramps and platforms.

A 16-page booklet of useful data and information on the Embeco Non-Shrink Method of Grouting may be obtained from the manufacturer, The Master Builders Co., Cleveland 3, Ohio.

Contractors and Engineers
magazine of modern construction

CONTENTS

OCTOBER, 1953

DEPARTMENTS

William H. Quirk, *Editor*
Field Editors, Albert C. Smith, Ralph Monson
Associate Editor, Catherine J. Hearn
Assistant Editor, William J. Dowdell

Donald V. Buttenheim, *Publisher*
Contributing Editors, Ray Day, L. H. Houck
New Products Editor, Frank Kypreos
Art Director, Henry E. Salloch

President, Edgar J. Buttenheim
Secretary and Treasurer, Edwin Wagner
Business Manager, Edward George Allen, Jr.
Assistant Advertising Manager, Edgar M. Buttenheim
Southern Sales Manager, Curtis R. Buttenheim

Vice President, George S. Conover
Advertising Manager, Myron MacLeod
Production Manager, Edna A. Jones

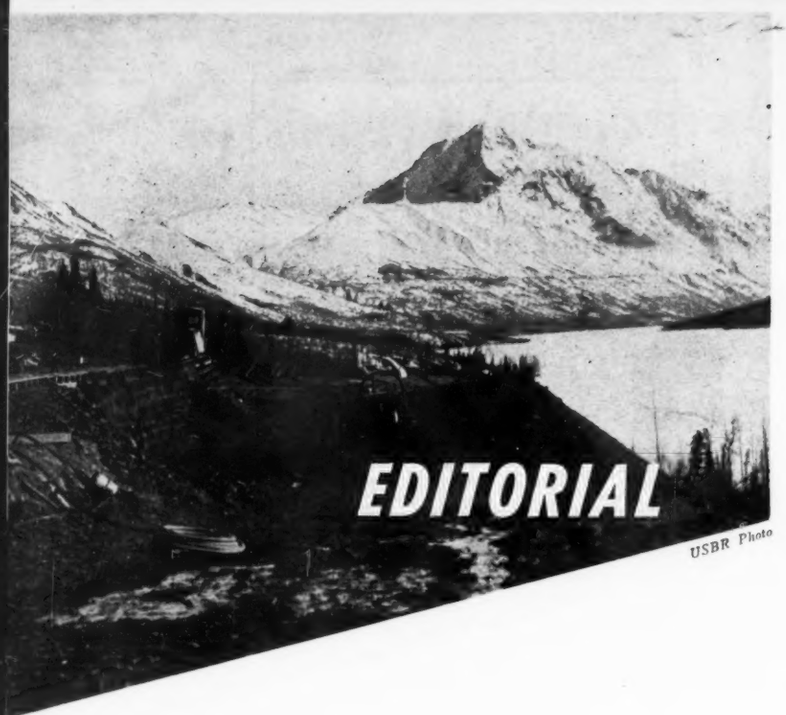
Acceptance under Section 34.64 P. L. & R. Authorized Vol. 50 No. 10 $4 a Year, 50 Cents a Copy

Issued Monthly by
BUTTENHEIM-DIX PUBLISHING CORPORATION
470 Fourth Ave., New York 16, N. Y.

CHICAGO 6, Ill., 1719 Daily News Bldg.
George S. Conover, Warner H. Robinson, Arthur B. Burgan

CLEVELAND 14, Ohio, 420 Leader Bldg.
Robert C. Burton

LOS ANGELES 27, Calif., 2238 Ben Lomond Drive
Albert T. Miller



"Seward's Folly"—1953

The picture above shows a portion of Alaska's Lake Eklutna, whose waters will be used to supply hydroelectric power for Anchorage, Alaska's largest city, with a population of about 50,000.

Because of the tremendous construction program now under way in Alaska, this magazine sent its western editorial representative, Ray Day, on a field trip this summer to this last frontier of U. S. civilization to report on some of the major military defense and civil engineering works. A series of articles covering the assignment begins with three stories in this issue. The first, on page 26, gives a general appraisal of the current construction boom and the various governmental agencies sponsoring the projects.

Next, on page 50, is a description of the Eklutna hydroelectric power project—the U. S. Bureau of Reclamation's first major Alaskan undertaking which includes tunnel boring, dredging, and penstock and powerhouse construction. While drilling the tunnel, the contractor's men were forced to dispose of a bear that got too curious for his own good. As seen on our front cover, the interfering bruin was escorted from the job site, and not under his own power.

Our third article, on page 82, covers the construction of a plane parking apron at Eielson Air Force Base and the method of combating the permafrost, which can ruin a pavement during the thawing season.

In subsequent issues, our series of Alaskan articles will include an airport maintenance report, with particular reference to how the powdery dust from active volcanoes is cleared from the runways; an article about the operation of the permafrost laboratory run by the U. S. Army Corps of Engineers, and how its findings enable construction firms in Alaska to do a better job; and one about building reinforced-concrete barracks under severe climatic conditions. An article on how the Alaska Road Commission maintains its 1,200-mile system of highways; and a feature story about an equipment distributor firm that was started by the Russians in 1791 are also included in the series.

Alaska has played a significant part in our history since William Seward, President Johnson's Secretary of State, got Czarist Russia to cede it to the United States for $7,200,000 in gold in 1867. Although the area acquired was more than twice as big as the state of Texas, the deal was nicknamed "Seward's Folly" since the vast tract was generally considered worthless except for the seal fisheries. The discovery of gold in 1896 would have surprised Vitus Bering, the Dane employed by the Russians, who discovered Alaska in 1741. Since then Alaska, which became a Territory by an Act of Congress in 1912, has proved to be a land of great mineral resources that have not yet been fully explored and have only begun to be developed.

While most of the money going into Alaska today hinges on the military situation in one way or another, civil construction plays an important role in current Alaskan progress. If Alaska becomes our 49th state, its economy should not be so dependent on boom defense spending. If and when the latter peters out, Alaska would be in a better position as a state than as a territory to develop her resources on a more stable and rational basis. When that time comes and greater emphasis is placed on private construction, the builders of Alaska will have benefited greatly from the lessons now being learned under the defense program.

News and Views

Throughout any year, statistics, which have been piling up quietly in various quarters, suddenly take on a special meaning when they are tabulated and compared with those of previous years. Such is the case with **taxes on gasoline** and motor vehicle registrations, which have shown general increases in almost all states. Alabama's gas tax, for instance, yielded a total of $34,790,321 during the first ten months of the state's fiscal year. This is more than two million dollars over last year's collections and represents a rise of 6.47 per cent. Record totals in gas taxes were also racked up by Arkansas and Delaware.

Revenue from **motor vehicle registrations** is also spiraling upward. Kansas expects to set a new record of 953,000 cars and trucks registered this year, topping last year's 920,571. Oregon's registrations are running 412,000 so far this year compared with 392,202 for a similar period last year, while South Dakota's registrations are 24 per cent over the same period for last year.

States are also vying with each other to increase revenue from another source. A number have retained outside engineering and professional consultants to conduct surveys of **industrial development potentialities** within their borders. And a plan has been proposed by the Wisconsin Bankers' Association to encourage industrial building in that state. It contains provisions for the establishment of credit pools by state banks to make risk capital available to industries in that state. Among the **larger industrial projects** now being developed are an eight million dollar plant in Mexico, Mo., being built by Lange Bros., Inc., and a thirty million dollar plant on Georgia's Savannah River, being built by American Cyanamid Co. Ciba States, Ltd., has a seventeen million dollar plant nearing completion near Toms River, N. J.—the first industrial construction job in what has heretofore been a summer resort area.

Although states would probably like less competition in the field of industrial building, Utah is preparing to take a step which would make **bidding for school construction** more competitive. A standard agreement has been recommended by the state to help assure open specifications for all contractors bidding for work. One provision prohibits the architect from using manufacturers' engineering services when specifications are prepared. In addition to allowing more competitive bidding, this will allow bidders a free choice in the selection of structural materials. The plan was formulated after complaints had been received that specifications were written so that not all firms could bid.

Placing the last structural beam for the South Street Elevated Highway in New York City called for a ceremony. With photographers and city officials on hand, Bethlehem Steel Co. workers set the final span member in place. The asphalt paving on a concrete base is scheduled for completion by the end of the year. (See C. & E. Aug. 1953, p. 46.)

An answer to brush burning

◀ A maintenance man works behind the Fitchburg power chipper, clearing brush on the Washington State highway system. The unit, driven by a Hercules engine, disposes of ½ mile of heavy brush per day, and replaces the brush-burning method of disposal.

Ray Day Photo

IN THE HIGH, forested country around Snoqualmie Pass on U. S. 10 in the Washington state highway system, maintenance crews have long disposed of brush trimmed from trees along the highway by burning it. Although this has been done for years, burning has always presented a problem because of the dampness and rain characteristic of the Snoqualmie Pass area.

A mechanical solution to the problem has now been found. A Fitchburg power chipper, driven by a Hercules engine and towed behind a 1½-ton state highway maintenance truck, rips to shreds brush as large as 2 inches at the butt. The machine requires little human effort because the sharp, high-speed chipping knife is designed so that it pulls brush in after workmen lay it on a receiving apron.

The machine and a crew of three men cleaned up a half mile of heavy brush, such as is shown in the picture, in six hours working time and would have done more, according to the foreman, had the chipping knife been newly sharpened. When the picture was made, the chipping knife was due to be taken off and resharpened. The cutting edges usually last three days when working in heavy brush.

The chipper reduces a piece of brush to bits of finely chopped wood, and blows them out at high velocity to the edge of right-of-way limits along the roadside. In Washington's damp country, the chips soon disintegrate, making wonderful roadside fertilizer. Many amateur and professional gardeners bring trailers into these areas to pick up the valuable compost after the splinters have rotted a few months. Apple growers at Wenatchee are using the machine for the disposal of pruned branches in the same way maintenance crews use it to clear brush.

Wherever heavy roadside brush-disposal is a maintenance problem, the power chipper provides a high-speed economical substitute for burning. And compared with burning, the finished job is much neater.

Promoted at IIT

Elmer I. Fiesenheiser has been appointed director of the civil engineering department at Illinois Institute of Technology, replacing Dr. Frank W. Edwards, who has resigned.

Mr. Fiesenheiser came to IIT in 1943. Previously, he had been a structural engineer for private companies and the government and had done consulting work. He received his masters degree from IIT in 1946 and was made a full professor in 1951.

Several ASTM Pamphlets

The American Society for Testing Materials has published a booklet of standards on bituminous materials for highway construction, waterproofing, and roofing. It brings together the 105 standard and tentative specifications, test methods, recommended practices, and definitions of terms pertaining to bituminous materials for highway construction, waterproofing, and roofing.

Other publications brought out by ASTM include the identification and classification of soils; standards on mineral aggregates, concrete, and nonbituminous highway materials; and a manual on industrial water.

Further information may be obtained by writing to the Society at 1916 Race St., Philadelphia 3, Pa.

Conventions are listed on page 97.

Names in the News

Arvin S. Wellborn, chief engineer of The Asphalt Institute.

Asphalt Institute Elects

Arvin S. Wellborn, former managing engineer of the Pacific Coast Division of The Asphalt Institute, 801 Second Ave., New York 17, N. Y., has been named chief engineer of the organization. In his new post, Mr. Wellborn has national direction of an engineering staff promoting the use of asphalt and developing research for asphalt applications.

Mr. Wellborn has been with the Institute since 1949. Prior to that, he served as engineer in charge of design and construction of airfields for the U. S. Navy, and held various positions with a pavement construction firm and the Arkansas Highway Department.

Manning Named Director

John J. Manning, retired vice admiral and former chief of the Bureau of Yards and Docks, U. S. Navy, has joined the firm of Kelly & Gruzen, architects and engineers, 80 Fifth Ave., New York 11, N. Y. Admiral Manning is to serve as technical director in charge of engineering phases of the firm's work.

He is a member of the American Society of Civil Engineers, the American Concrete Institute, and is past president of the Society of Military Engineers. Kelly & Gruzen designed the General George W. Wingate High School, now under construction in New York, and the new Albert Einstein College of Medicine, to be erected in the Bronx.

Navy Architect Retires

Charles F. Carter has retired as design architect in the Navy Bureau of Yards and Docks after 19 years of service. During his career with the Bureau, he worked on such projects as the Human Centrifuge Building for aviation research at Johnsville, Pa., and the remodeling of the White House.

Mr. Carter also served as a member of the Task Group for Development of Design Requirements and Construction Standards for Military Hospitals, for which he received commendations from the Secretary of Defense and the Director of the Budget. He is a director of the Association of Federal Architects.

Newman To Represent Scientific Design Co.

Dr. Philip E. Newman has been appointed European representative by Scientific Design Co., Inc. He was chief chemical engineer and project manager for the Pechiney Co. of France before his present appointment.

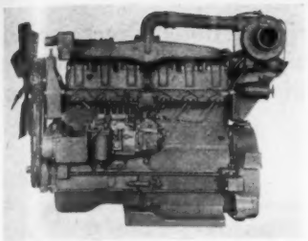
Dr. Newman has also served as a Captain in the U. S. Army Corps of Engineers, operations officer in the Military Government Control of the German chemical industry, and he has served as chemical engineer for Hercules Powder Co.

Captain James C. Tily, USN, watches Roger Corbetta, New York contractor, sign an $8,662,000 contract for drydock reconstruction at Brooklyn Navy Yard.

Kaiser Shifts Engineers

George Schumann has been appointed to the newly created position of chief design consulting engineer for Kaiser Engineers, Division of Henry J. Kaiser Co., Oakland, Calif.

Mr. Schumann, after wide experience both here and abroad, joined Kaiser Engineers in 1946, and eventually became chief design engineer.



The Hercules Model DFXE-TS diesel engine.

New Diesel Engine Is Turbo-Supercharged

■ A turbo-supercharged version of its six-cylinder diesel engine model DFXE is announced by the Hercules Motors Corp., Canton, Ohio. The new 318-hp engine, the model DFXE-TS has a 5⅝-inch bore, a 6-inch stroke, and 895-cubic-inch piston displacement. The engine develops 846-foot-pounds torque at 1,800 rpm and 318 hp at 2,000 rpm.

The supercharged model provides more horsepower than the previous version without increasing the fan-to-flywheel length. It is recommended for power construction equipment in the 300-hp class.

For further information write to the company, or use the Request Card that is bound in at page 18 Circle No. 96.

Vibrating Tamping Unit Compacts Road Subbase

■ How macadam subbases for highways are laid single course with a crawler-mounted vibrating and tamping unit is shown in literature from The International Vibration Co., 16702 Waterloo Road, Cleveland 10, Ohio. The Vibro-Tamper can compact a single 12-inch course to 9 inches in as little as one pass, according to the manufacturer. In addition to eliminating unkeyed planes encountered in two and three-course construction, the unit also eliminates backtracking of equipment and reduces labor for rolling and brooming.

Photographs show the Vibro-Tamper in operation on a variety of highway paving operations, including bituminous concrete construction. A list of contractors and some jobs on which the unit has been employed is included.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 67.

New Seaporcel Office

Seaporcel Metals, Inc., Long Island City, N. Y., has established a regional office in Atlanta, Ga., which will serve as a liaison center for the company's agents in the southeastern area. Located at 1222 Peachtree St., N. E., the office will provide an advisory and consultant service on porcelain building materials. It is under the supervision of Jerome R. Salton, former New England regional manager.

Other regional offices of the company are located in Boston, Mass., for the New England area; and Silver Springs, Md., for the Washington, D. C., section. The company manufactures porcelain panels for building exteriors and interiors, tunnel ceilings, and a variety of other applications.

Steam Cleaning Machine

■ Literature is available on an oil-burning steam cleaner made by Kelite Products, Inc., 1250 N. Main St., Los Angeles 12, Calif. A feature of the Model K15-A steam cleaner is that it preheats water to increase its temperature by 50 degrees before the water enters the heating coil. It does so by using trapped radiated heat that is ordinarily wasted.

Output of the cleaner is 150 gph. The burner is fully automatic with spark ignition. It operates on standard fuels from gasoline to No. 3 diesel fuel without changing openings or burner parts. The fuel tank holds 25 gallons, enough for 8 hours of continuous operation. Fuel consumption is about 3 gallons per hour.

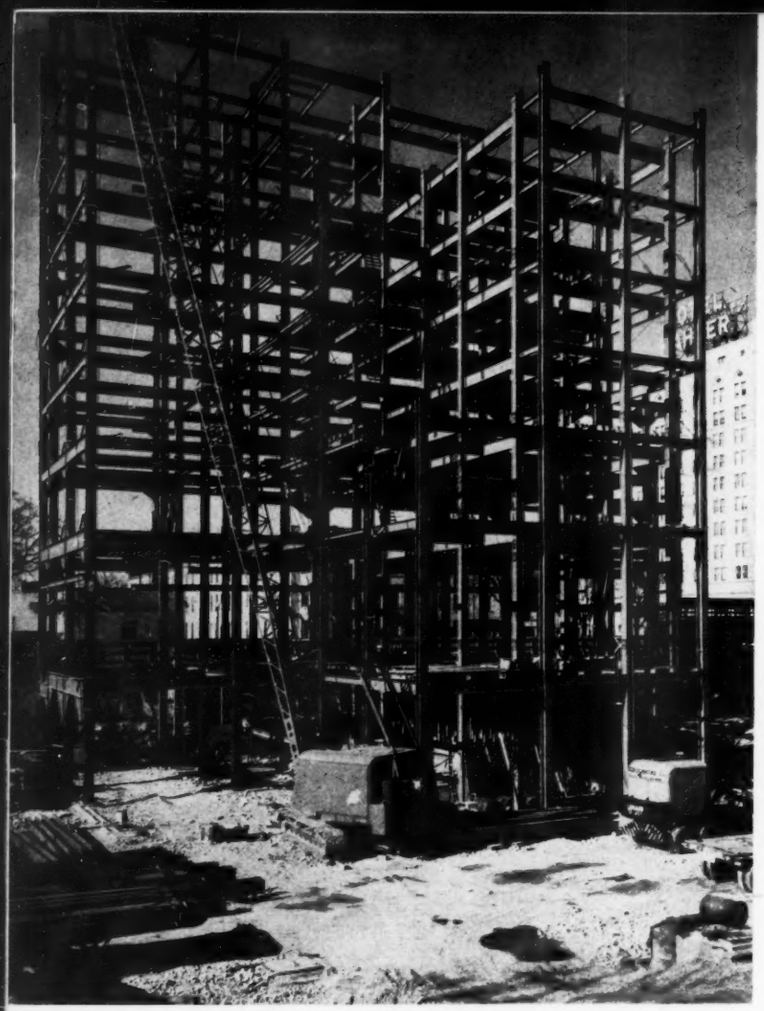
A safety feature is the thermal shut-off switch with manual reset installed in the steam discharge line to prevent operation of the machine if the water supply should happen to fail.

The 51-inch steam gun comes with aerated gun grips.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 38.

Euclid Appoints Miller

Melbourne W. Miller has been appointed district manager by The Euclid Road Machinery Co., Cleveland, Ohio. He will supervise activities of Euclid distributors in the following territory: Montana; Alberta, Canada; North Dakota; and part of South Dakota.



Structural framework for one wing begins to take shape. The Lorain crane at right unloads steel while the Speedcrane handles the erecting.

Hospital Building Has Bolted Steel Frame

Substituting for rivets, bolts effect saving in Mayo Clinic's building at Rochester, Minn. Impact wrenches give bolts proper tension.

HIGH-TENSILE BOLTS—more than 160,000 of them—were substituted for rivets in the erection of the steel frame of the Mayo Clinic's new building in Rochester, Minnesota. Since the 11-story diagnostic unit stands in the midst of a hospital and hotel area where thousands of sick people are being cared for and housed, and the noise of riveting would have been objectionable to these patients, all the field connections were bolted, greatly reducing the noise.

Equally important, the use of high-tensile bolts also effected a saving in cost, according to the contractor, on the structural framework. These special bolts develop the same shear and bearing values as rivets of equal size. (See "High-Tensile Bolts Cut Erection Costs," CONTRACTORS AND ENGINEERS, October, 1952, page 60.) Because of the high torque required to obtain proper tensioning of the bolts, hardened steel washers must be used under both head and nut.

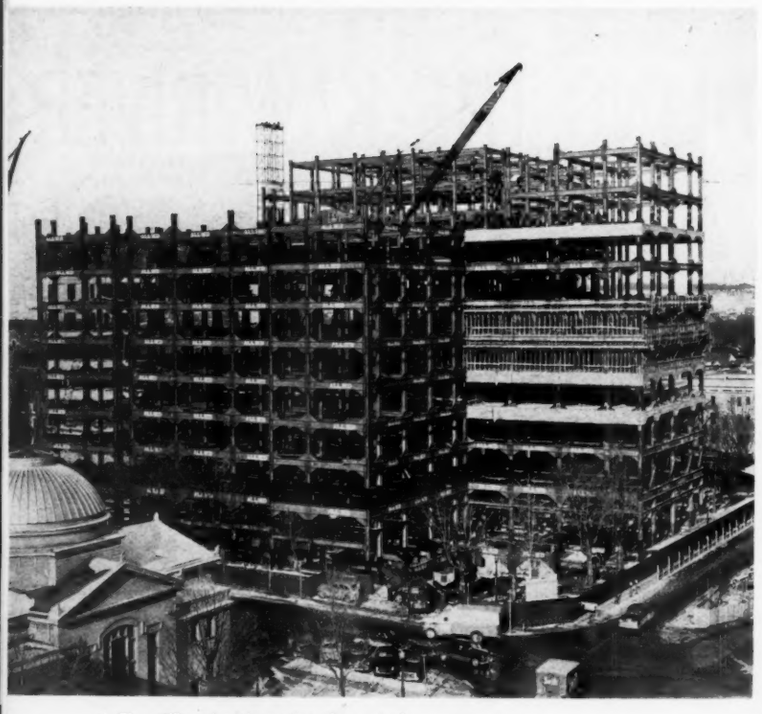
Bolt Advantages

Holman Erection Co. of Minneapolis, Minnesota, which placed the structural steel, pointed out these advantages in favor of bolts: a bolting crew consists of two men, whereas four men are required for riveting; skilled riveting crews are not always available, especially outside the larger cities; more scaffolding is usually required for riveting than for bolting. Some of these advantages, however, are offset by the higher cost of bolts and washers.

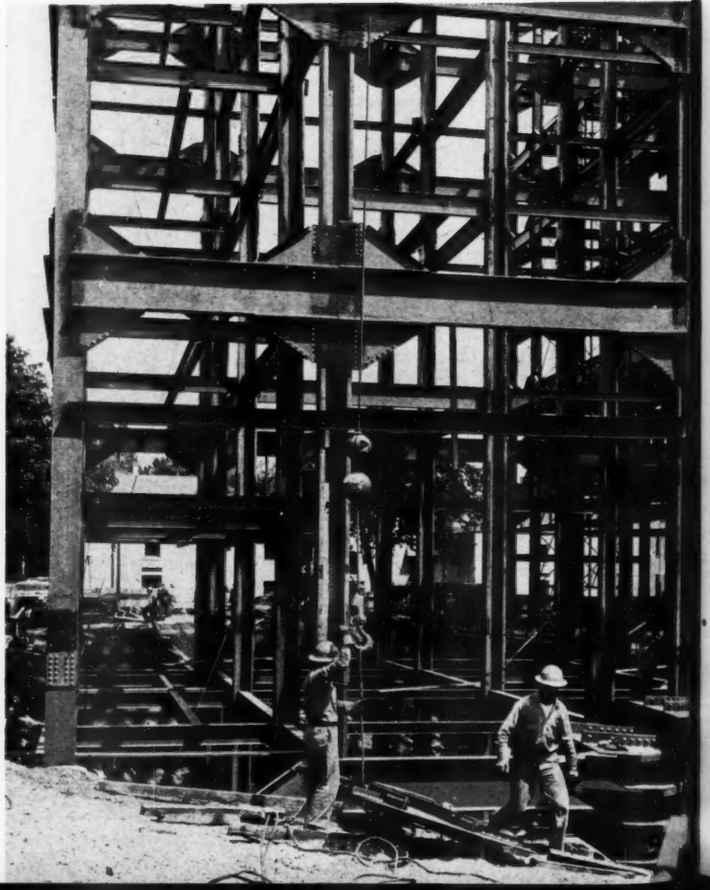
Ingersoll-Rand air-powered impact wrenches were used to obtain proper tensioning of the bolts, an extremely important factor in the use of high-tensile-bolted connections. As many as ten wrenches were in use at one time by as many crews. Air for the wrenches was supplied by a 105 Le Roi compressor.

The 8,600 tons of structural steel, consisting almost entirely of rolled sections, was furnished by Allied Structural Steel Co. of Chicago. Gary Steel Supply Co. of Chicago supplied the 160,200 ⅞-inch-diameter bolts and 320,400 hardened washers.

In the structural design, the engineers realized that the largest available rolled column section, 14-inch x 425 pounds per foot, did not meet stress requirements for certain members. Rather than use built-up



▲ The stiffleg derrick, center, places steel for the unit's 10th and 11th floors and penthouse. In the background, one of the twin Archer material towers is visible above the building.



A section of the unit's steelwork, showing several bolted connections. More than 160,000 high-tensile bolts were used. ►

By RALPH MONSON, Field Editor

sections in these instances, they specified high-tensile steel in place of the normal mild steel. More than 4,000 tons of Tryten high-tensile steel went into these sections.

Crane Has 160-foot Boom

In the erection of the steel framework, Holman's 3000-B Manitowoc Speedcrane attracted a great deal of attention. It was equipped with 140 feet of boom, plus a 20-foot jib, making a total boom length of 160 feet. This is the longest boom known to be used on a movable crane in this area. Working from grade, the crane placed all the steel framework for the first nine floors of the building.

Augmenting the reach of the Speedcrane, a stiffleg derrick placed steel for the 10th and 11th floors and the penthouse. This derrick, with 125 feet of boom, was powered by a 7500 American hoist.

Steel was unloaded from cars at a nearby siding by a Lorain Moto-Crane and hauled to the site on two GMC trucks with Trailmobile semi-trailers. The versatile Moto-Crane frequently loaded trucks at the siding, then accompanied them to the job site and unloaded them. This allowed other hoisting equipment to continue work without interruption.

Structural steel erection required about one year, with an average work week of 45 hours, and was accomplished without any serious accidents.

The unit, occupying an entire city block, is shaped like a cross. Rectangular courts take up the remaining space on the block. One of them is used for service entrance and the other three are landscaped. Special care was exercised by the contractor to preserve trees in these courts, since they will be incorporated into the landscaping plan.

Although eleven floors and a penthouse are being constructed at this time, the structure is designed so that an additional eight floors can be added in the future. There are approximately 49,000 square feet of space per floor—a total of about 560,000 for the whole building.

Most of the mechanical equipment is located on the 11th floor. With the exception of this and the ground floor, other floors have similar room arrangements. A main lobby occupies the center of the cross, and double aisles lead into each wing. Each aisle is flanked on both sides with small offices, examination rooms, and consultation rooms.

Fifteen elevators will transport staff and patients. Of these, ten are provided for the public, four for the staff, and one for service. Two of the elevators have been installed and are used for the transportation of construction personnel.

Exterior is Marble

The finished exterior is an unusual combination of sheer, unbroken marble faces rising eleven stories above the street, and adjacent walls, finished entirely with aluminum and glass, facing the corner courts. Sixty carloads of Georgia marble in pieces averaging 3 x 4 feet in width and length, and 3 inches thick, are incorporated into the four walls that border the sidewalk.

The marble panels, weighing about 400 pounds each, were handled by a small Sasgen hand-crab, mounted on a rubber-tired, three-wheeled carrier. At times, the operator of this hoist handled marble for several floors from a single setting of

(Continued on next page)

Sheer marble faces and walls of aluminum and glass are combined in the new Mayo unit.

Diagnostic Unit Has Bolted Steel Frame

(*Continued from preceding page*)

the carrier. Frequently, it was impossible for him to see the point of placement for the material he was handling. However, with the use of an intercom system, he kept in constant contact with the marble-setters on the hanging scaffold outside the building. The marble, set in mortar, is held with lewis pins.

Insulated aluminum sections, which make up the other faces of the building, consist of interlocking extruded aluminum shapes approximately ⅛ inch thick. The design gives the effect of vertical fluting. Exterior aluminum has an anodized finish.

Windows are wider than they are high and have unbroken glass areas. All have a stationary sash, except those in the end of each row, which are outswinging casements. They allow window washers to get out through the casement at one end of a row, attach safety belts to a special rail along the top of the windows, and proceed along the entire row, re-entering through the casement at the opposite end. All sashes are glazed with Pittsburgh Twindow units.

On the south exposure, louver-type aluminum shades with vertical slats, resembling venetian blinds turned horizontally, eliminate the glare of the summer sun but admit a generous amount of light.

Air Conditioning

The entire building is completely air conditioned. This was necessary because more than half the rooms have no outside exposure. Complete, year-round air conditioning includes summer cooling and dehumidifying and winter heating and humidifying of the numerous small offices and the larger lobbies and waiting rooms. Summer cooling is accomplished with chilled water, piped to the building at 40 degrees F from a large refrigeration plant in the Franklin Heating Station about a block away.

This cooling plant, with a capacity of 3,000 tons of refrigeration, is believed to be the largest in use for comfort air conditioning. The diagnostic building utilizes more than half of the plant's capacity, and the balance is available for other nearby buildings.

Excavation

O. A. Stocke & Co., Inc., of Rochester, the general contractor, employed subcontractors on the plumbing, heating, air conditioning, electrical, and excavating phases of the work. The first to get to work on the jobsite were the excavators. Removal of the old Central School building which occupied the site was the first step. The building had housed a medical museum after it was abandoned as a school. After the structure was removed by a wrecking contractor, removal of footings and excavation were carried on by two local contractors, Leon Joyce and Burt Leitzen.

Joyce used two Northwest ¾-yard shovels to load the 35,600 cubic yards of earth excavation into trucks for the 1½-mile haul to the dump site. His fleet of 5-yard Macks and Internationals was augmented by a number of privately owned trucks as well as a number of Chevrolets belonging to Leitzen. Leitzen's Moto-Crane and Caterpillar D4 also assisted in the excavation and removal of old building foundations.

Rock Excavation

With the earth excavation out of the way, the contractors moved in with their rock equipment to remove nearly 10,000 cubic yards of limestone, 3,100 yards of which came out of footing holes. These holes were 6 foot square and up to 14 feet in depth. Two Joy air compressors, a 105 and a 240, provided air for the drilling which was done with Ingersoll-Rand wagon drills and hand-held tools.

The procedure for removing the footing holes resulted in very satisfactory excavations which were poured without forming. An exploratory hole was first drilled to sufficient depth in the center of each footing to make sure the rock was satisfactory for the footings. Holes were then drilled to the required depth at the four corners and at the mid-point on each side. The holes were then loaded with dynamite, which used an instantaneous cap in the center hole and delays in the outer holes.

The shots produced straight walled square holes and resulted in a large amount of the rock being thrown out of the excavation by the blast. A minimum of hand labor removed the remainder. The D4 dozed the rock into piles, and shovels loaded it into trucks. To remove rock in larger holes for elevator pits, one side of the hole was sloped and the shovel ramped into the excavation.

Because of the proximity of other buildings and the quiet nature of the area, it was necessary to use light charges in the blasting. A normal maximum shot consisted of six or eight 1¾-inch holes, each loaded with three pounds of Atlas 60 per cent dynamite. Wire-rope mats confined flying rock during blasting operations.

Concrete footings were poured as soon as excavations were ready. Ready-mixed concrete was supplied by the Rochester Ready Mix Concrete Co. in Jaeger and Rex 3-yard mixers mounted on K-8 International trucks. A ramp led into the excavation, and the ready-mix trucks discharged directly into the footings.

A total of 264 tons of steel baseplates, machined and furnished by Lukens Steel Co., were placed on the concrete footings. Excavation, pouring of footings, setting base plates,

and erection of structural steel proceeded simultaneously on various parts of the site.

Placing Concrete

Concrete operations followed closely behind erection of the steel. Exclusive of footings, the entire 15,200 cubic yards of concrete for the structure were produced on the site. A clever arrangement of equipment permitted unloading of cement and aggregates at street level, with complete gravity flow of materials through a Winslow Binanbatch setup to a 16S Rex mixer. The mixer discharged concrete into the skip at the bottom of the hoisting tower, and then it was hoisted to the proper level for pouring.

From a hopper at the floor under construction, the concrete discharged into Jackmanco buggies and was wheeled to the point of placement. Dart electric-powered vibrators, with 1⅛-inch heads, vibrated the concrete in place. With this setup, up to 300 cubic yards of concrete were produced in an 8 to 10-hour shift.

Much of the concrete was poured during the winter, with temperatures often below zero. Floors under construction, enclosed in canvas, were heated by Herman Nelson and Silent Glow heaters, plus some steam unit heaters where steam was available. As many as 23 portable heaters were in use at a time during cold periods.

Top Floors Finished First

When the owners decided to occupy the top three diagnostic floors as soon as possible—in fact, at least a year in advance of the entire building's completion—concrete pouring schedules were arranged so that floors 8, 9, and 10 were poured first. Inside finishing proceeded on these floors while concrete was being placed below. This arrangement gave the contractor a roof and protected his workmen from the elements as the lower floors were poured. It also protected workmen against objects falling from overhead.

Forms for concrete were suspended from the steelwork as much as possible, minimizing the amount of shoring required.

As soon as the concrete had attained sufficient strength, the brick and tile curtain walls were constructed. Gold Medal hanging scaffolds were exterior working platforms for bricklayers as well as for crews placing marble and aluminum panels. Mortar for masonry was mixed in two electric-powered, 6-cubic-foot Rex mixers and delivered in wheelbarrows to the masons.

Two twin Archer material towers were set up at opposite corners of the building. The towers, 208 feet high, were equipped with a Chicago boom in addition to two material skips. American 3-drum hoists, powered by 40-hp Master electric motors, operated the 5,500-pound capacity hoists at a speed of 250 feet per minute.

In addition to the outside hoists, Stocke set up two material-handling skips in future elevator shafts inside the building. These were equipped with American hoists, powered with 40-hp General Electric motors.

Interior Finishing

Since all the offices are being equipped for medical diagnosis and with complete air conditioning, there is an unusual amount of mechanical work to be done. Most of the duct work is being fabricated right on the job. Practically the entire seventh floor is occupied temporarily by shops where piping, sheet metal, and wood fixtures are fabricated.

Unusual mechanical features include snow-melting coils built into sidewalks and driveways. The 12,000 square feet of sidewalk and 4,000 square feet of driveway will require the snow melting system to contain about 1,300 gallons of antifreeze, plus an equal amount of water. Another mechanical device is an electric-eye smoke-detection system installed in fans delivering air to occupied areas. This device closes a shutter in the duct and prevents circulation of air if smoke is detected.

Construction started in the fall of 1950, and the cornerstone was laid March 31, 1953. Completion of the entire structure is scheduled for September 1, 1954. Its estimated cost is $12,000,000.

Quantities

Excavation	
Earth	35,600 cu. yds.
Rock	10,000 cu. yds.
Concrete	15,200 cu. yds.
Structural steel	8,600 tons
Reinforcing steel	825 tons
Marble	60 carloads

Personnel

Ellerbe & Co. of St. Paul, Minn., are architects and engineers for the project. Their Rochester office is supervised by E. W. Buenger. Ellerbe's field superintendents are Robert Palmer and Charles Steenberg on general construction, and Louis Blazek on mechanical features.

General superintendent for the O. A. Stocke Co., Inc., is Wm. A. Fiebelkorn. Milton S. Miller is chief engineer for Stocke.

Pull-Type Scrapers

■ A new catalog covers the line of seven pull-type scrapers available through Allis-Chalmers dealers. Detailed views of the Allis-Chalmers and Gar Wood scrapers are shown.

The line provides a selection of equipment with struck capacities ranging from 2 to 18 cubic yards. It includes units for any size crawler tractor in the field today.

The catalog gives complete specifications.

This literature may be obtained from Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis., or use the Request Card that is bound in at page 18. Circle No. 151.

The Servis ditching terracing blade shifted to the right.

Side-Shift Feature on Tractor-Mounted Blade

■ A ditching and terracing blade that fits Ferguson, Ford, and similar 3-point lift tractors is offered by the Servis Equipment Co., 1000 Singleton Blvd., Dallas, Texas. The blade features 3-way positioning. It can be set in standard fashion for forward work and can be reversed from the tractor seat. With the removal of two pins, the blade can also be extended 24 inches to the right or left of the rear tires of the tractor. This permits close cutting near fences, buildings, and use in backfilling ditches.

In addition to these basic positions, 21 different adjustments for pitch, angling, lifting, and tilting of the blade can be made. An extreme vertical cut of 45 degrees is possible.

The new blade is recommended for terracing, digging and cleaning ditches, backfilling, roadway work, and snow removal.

The cutting blade is ½ inch thick by 6 inches high by 6 feet long. Height of the moldboard is 16 inches, and ground clearance is 20 inches.

For further information write to the company, or use the Request Card at page 18. Circle No. 80.

Catalog on Pipe Tools

■ A catalog on a line of pipe tools is available from Beaver Pipe Tools, Inc., 325 Dana St., N. E., Warren, Ohio. The booklet carries information on pipe and bolt threaders, square-end sawing vises, pipe reamers, power and hand cutters, and pipe and bolt machines. Also included are the new Beaver Model D power drive, the No. 55 nipple chuck, and the Nos. 2 and 4 direct-pressure pipe cutters.

Information given includes specifications and prices.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 152.

Precision Acquisitions

Precision Equipment, Inc., Danbury, Conn., has purchased Hill Machine Co., Newtown, Conn., which will continue under the corporation's name and at its plant in Bethel, Conn.

The following officers were elected: G. E. Woods Humphery, chairman of the board; Herbert Michel, president; and Robert Ducas, vice president.

Precision Equipment has also acquired control of Warsop Power Tools, Inc., Wilmington, Del., and moved its business to the Bethel plant.

Data on Carryable Pumps

■ Gasoline-engine-driven centrifugal pumps light enough to carry are shown in literature from the Homelite Corp., 71 Riverdale Ave., Port Chester, N. Y. The pumps range from 1½ to 3-inch models and weigh from 45 to 95 pounds. Capacities run from 5,500 gph to 15,000 gph.

Other features stressed are climbing speed, high suction lift, and the ability of the pumps to handle mud and sand. A table lists priming time at different suction lifts. Cutaway views indicate the working mechanisms of the pumps.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 43.

Vane Borer Used in Bridge Cost Study

By G. BRYCE BENNETT
Materials Engineer,
Idaho Department of Highways

and

JAMES G. MECHAM
Testing Technologist,
University of Idaho

Swedish method is employed on Idaho bridge project; results indicate that it is fast, accurate, and economical

IN-PLACE STUDIES of the shear strength of clay under the Sandpoint Bridge in northern Idaho were speeded considerably by vane boring. With the exception of a limited amount of work done with this method by the Illinois Institute of Technology, vane boring is new to the United States. It has been used extensively in Sweden, however, and the recent results on Idaho's Sandpoint Bridge show much promise. The results of the field vane boring were checked by conventional consolidated triaxial methods.

The need for some rapid method of studying the Sandpoint location arose when the 20-year-old untreated timber structure, which was over 10,000 feet long, had to be replaced across the outlet of Pend Oreille Lake. Certain characteristics were well known. Nearby, a railroad bridge embankment made of earth had stood the test of time. The water was quite shallow on the north side of the lake. The entire area in the section under study had a sand cover 8 to 10 feet thick, underlaid by a varve clay to a depth exceeding 140 feet.

If an earth embankment could be used for a substantial portion of the new bridge, it would tend to lower the over-water length of the bridge portion. Until the vane borer method was evolved, however, studies were not too promising.

A field investigation in 1945 brought in some disturbed samples to the Boise laboratory. Tests indicated that the material was poor, as far as a foundation was concerned. Further sampling was done in the summer of 1950, when numerous undisturbed samples were taken and tested at the University of Idaho. The shear strength of the clay, checked by triaxial compression and unconfirmed compression tests, showed a variance of from 400 to 600 pounds per square foot.

In practical terms, it amounted to this: if the shear strength was 600 psf, 13,000 cubic yards per station would suffice for the embankment. But if the shear strength was actually only 400 psf, 38,000 cubic yards per station would be needed, and engineers knit their brows when they calculated the enormous cost of all that extra material.

Because of the length of time and difficulty in obtaining undisturbed samples for conventional tests, the vane boring method seemed to hold forth a promise of speed, accuracy, and low cost. Certainly, the variance of the previous sampling proved that more tests—many more—were called for if the underlying material was ever to be pegged accurately for its load-bearing characteristics.

Fortunately for the state of Idaho, two Swedish technicians, Lyman Cadling and Sten Odenstad, had done considerable work with the vane borer through the Royal Swedish Geotechnical Institute. In 1950, they prepared and published an excellent report on the subject, giving the size of the vane, number of wings for each vane, and the speed at which the test should be conducted. The whole theory of the vane borer is that the shear strength of an undisturbed material can be rapidly measured in the field by the instrument's penetration.

Odenstad and Cadling concluded that a vane with four wings gave consistent results with a minimum of earth disturbance. They also said that the height of the vane should be at least twice its diameter in order to minimize disturbance at the ends.

The design of Idaho's vane borer followed these general recommendations. Three vanes were made:

(Continued on next page)

Vane Borer Used In Bridge Cost Study

(*Continued from preceding page*)

2 x 4 inches, 3 x 6 inches, and 4 x 8 inches. The vane was attached to a 1 x 30-inch extension rod, which went through a bullnosed grease-packed bearing, and attached to a 1½-inch galvanized iron pipe. Another 1 x 30-inch extension rod was attached to the 1½-inch pipe which went through the upper guide bearing and torque drum. A 3-inch casing attached to the bullnose and the upper-guide bearing enclosing the driveshaft. The vane may be adjusted for different depths by adding sections of 1½-inch pipe and sections of the 3-inch casing. During the driving operation, the torque drum and upper extension rod were removed and a driving head was attached to the 3-inch casing with the vane resting against the bullnose point.

After driving to the desired depth, the driving head was removed, the upper extension rod was attached to the drive shaft, and the vane was jacked 30 inches beyond the bullnose point into undisturbed material. The upper guide bearing and wheel and torque apparatus were attached. A cable was strung from the torque wheel through a pulley attached to a proving ring, and thence to a hand winch. Strain was applied at a uniform rate, and readings were taken until the test was complete.

In computing strength of shear stress values of the soil, the unit shear stress was assumed to be uniform over the entire surface of a cylinder whose dimensions equal that of the vane. Computation formulas and other data on the vane borer were given in full detail in a January paper which can be found in the latest Highway Research Board Proceedings (1953 meeting).

Rapid Testing

The tests moved along rapidly. They were made in the lake bed from a homemade barge, made of a pair of Army pontoons. The little barge had a steel A-frame, and used a Universal Prospector drill rig for lifting and churning the vane boring device. Attempts to drive the entire rig down to sampling depth generally failed, and the final procedure followed was to place a 6-inch casing through the sand cover, then jet or wash the vane stem and casing down to the correct sampling depth. After the jet water was shut off, crews churned the device down still further and pried it down 24 more inches to make sure it reached material undisturbed by the jetting operation.

Inherent friction in the vane borer was an item of concern, and friction curves were drawn for various depths and used as a correction factor for each vane test. The possibility considered was that there was enough lateral deflection between the vane stem and the outside casing to develop friction, and for a time, the device was withdrawn an inch after being pried into testing position. This only increased the disturbance to surrounding earth and reduced the shear strength values materially.

Undisturbed samples were taken occasionally near the vane holes so the vane borer could be checked by conventional tests. These were taken by an aluminum tube sampler 6 to 8 feet below the bottom of a casing.

Calculations for the vane borer method are detailed in Highway Research Board Proceedings. In general, the vane borer results approximated those made by the confined triaxial method and were much higher than those run by the unconfined compression method.

Results now indicate that the vane borer is accurate and economical to use in determining the shear strength of clay soil. Vane test results are readily computed in the field, with a great saving in laboratory work. In investigations of soil stability problems involving laboratory testing and undisturbed samples, the vane borer will economically allow a much more extensive testing program than conventional methods.

A point of interest is the fact that undisturbed samples were taken from eight borings with an average of six samples per boring for laboratory testing to correlate with vane results. The time to do this testing in the laboratory was much greater than the time it took an inexperienced crew to make vane tests in 30 borings, with approximately ten determinations per boring. Conservative estimates show that three vane tests can be run for every laboratory sample run on undisturbed material.

Now under way is a scheme for mounting the device on a 4-wheel-drive truck so that it can be taken

out in marshy field studies. Tests are being made to find what shape of vane causes least disturbance when driven into the soil. When these tests are complete and the "study buggy" is built, Idaho will have an instrument capable of saving many times its price in construction costs and in prevention of failures in construction.

Pressure-Injection Method Makes Foundation Piles

■ How foundation piles are made by pressure-injecting spread footings into soil is told in literature from the Franki Foundation Co., 436 Seventh Ave., Pittsburgh 19, Pa.

In this method a casing is positioned, and dry concrete is drawn to the bottom of the tube and tamped into a tight plug with a solid cylinder ram. The entire tube is then pushed into the ground by dropping the ram against the plug. When the proper depth is reached, the tube is anchored to the frame and with further ramming, the dry concrete is pushed out under the casing to form a bulb footing. To form the rest of the column, the tube is raised and concrete is rammed out as the casing rises to the top.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 127.

New Pipe Threader

■ A new pipe threader for use on power drives has been added to the line of pipe tools manufactured by the Ridge Tool Co., Elyria, Ohio. Called the Ridgid 504, it is entirely self-contained and can be adjusted to thread 1 to 2-inch pipe using only one set of dies. A quick-opening handle retracts dies instantly without stopping the power drive. Dies can be adjusted without removing the threader from the machine.

There is no lead screw to jam or wear out. The threader will fit all standard power drives. It has one set of high-speed steel dies and a preset four-jaw centering guide. It will cut oversize, undersize, and extra-long threads.

For further information write to the company, or use the Request Card at page 18. Circle No. 102.

Air-Entrainment Meter

■ Literature is available on a meter that measures the air content in air-entrained concrete. The Protex meter uses the pressure method based on Boyle's law.

Standard equipment includes a ¼-cubic-foot meter with a built-in funnel and pump. A standardization vessel is provided as well as a combination tamping and strike-off rod. The standardization vessel is used for the original calibration of the meter to give the standard air-pressure gage reading to be used for testing in a given locality.

The meter weighs 19 pounds, and only 1½ pints of water are needed for testing. Since the meter gives a direct reading of the percentage of air in concrete, no special training is needed to use the device.

To obtain this literature write to the Autolene Lubricants Co., Industrial Division, 1331 W. Evans St., Denver 9, Colo., or use the Request Card at page 18. Circle No. 45.

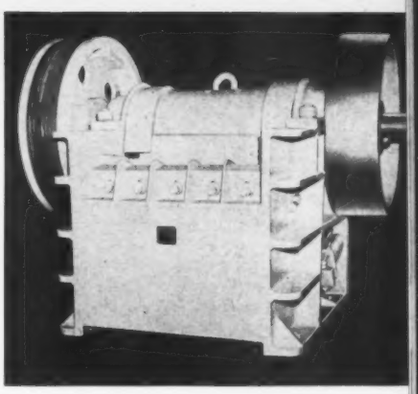
Tractor-Mounted Drill Rig

■ A self-contained tractor-mounted rock drill unit is illustrated in literature from Eugene Engineering Co., 1485 W. First St., Eugene, Oreg. The drill rig, which mounts any tractor with enough power to drive the compressor, can be positioned to drill any degree of a circle on either a horizontal or vertical plane. The compressor can be any standard air-cooled type that delivers about 400 cfm.

The 20-foot 6-inch feed makes for continuous drilling for 20 feet with one steel. The drill assembly consists of a standard 4-inch drifter, a standard wagon drill feed motor, chain and sprockets, and a 23-foot drill track. The winch assembly consists of a 7½-hp air motor and two worm-drive automatic brake winches. The winches are connected to the air motor through a selector clutch so that either winch may be operated.

A safety feature is that the drill may be operated from a movable control panel that allows the operator to stay away from the face.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 52.



The new Gruendler Series 10 jaw crushers have self-aligning roller bearings and heavy-duty manganese. jaws .and .cheek plates. A feature is the new Shelton hydraulic jaw attachment that enables the operator to adjust the crusher in less than one minute while in operation. For further information write to the Gruendler Crusher & Pulverizer Co., 2915 N. Market St., St. Louis, Mo., and request Bulletin No. BM-10, or use the Request Card at page 18. Circle No. 1.

The Gradall's flexible telescoping arm permits close and safe digging near existing concrete pipe. *C. & E. Photos*

Concrete, carried out on the boom of a Rex 34E dual-drum paver, left, is distributed in front of a Blaw-Knox spreader, center, then finished by the Jaeger-Lakewood machine at right.

Limited access highway paved with

Reinforced-Concrete on Slag Subgrade

BRIDGE SUBSTRUCTURE WORK is nearly complete and concrete paving is now underway along much of the big U. S. 22 bypass project in eastern Pennsylvania. If structural steel for grade separations arrives on time, traffic will be rolling over the 22-mile limited-access superhighway early next year.

The $25,000,000 job was started three years ago by the Pennsylvania Department of Highways to relieve congestion in and between the closely spaced industrial centers of Easton, Bethlehem, and Allentown. Now running through all three cities, U. S. 22 carries the bulk of the local and inter-city traffic and much of the through traffic between Harrisburg and northern New Jersey.

The bypass begins at the west side of the Delaware River Bridge in Easton, Pa., and plunges almost immediately into a number of deep rock cuts as it curves northwest out of the city. The alignment then straightens somewhat, and the 4-lane route runs generally parallel to U. S. 22, about two miles to the north. At Allentown, the bypass follows close to the city limits, then ties in with U. S. 22 several miles to the west.

Concrete Pavement

The entire length of the highway consists of four lanes of 12-foot-wide reinforced-concrete pavement, flanked along the outer edges by 10-foot stabilized slag-shoulders. In narrow sections, opposing lanes are separated by a 4-foot-wide raised concrete-median. A 20-foot-wide depressed mall separates opposing lanes in wide sections.

A Jaeger-Lakewood finisher works on a lane, following closely behind paving and spreading operations.

Both 12-foot-wide slabs in each direction slope transversely from the median strip; the inside slab at ⅛ inch per foot and the outside slab at ⅛ inch per foot. The 10-inch-thick shoulder slopes ¾ inch per foot in fills and 1½ inches per foot in cuts.

A special subgrade of slag was laid 6 inches thick under the inside edge of the concrete slab and carried out on a downward slope to an 8-inch depth under the shoulder. In fills, it is extended to the edge of the embankment. Drainage in cuts is taken care of by a 6-inch porous concrete pipe which is embedded in a 15-inch-deep slag trench under the outside edge of the shoulder. Where heavy drainage conditions exist in cuts, 15 to 36-inch open-joint concrete pipe or bituminous-coated perforated metal pipe is used.

First Sections

One of the earlier sections completed was a 1.4-mile stretch of grading and paving near U. S. 309 north of Allentown. The Pennsylvania Department of Highways had awarded the $1,000,000 contract to C. W. Good, of Lancaster, Pa. Work began in June, 1952, and was completed this summer.

After most of the grading was cleaned up early in spring, the contractor trucked slag from Bethlehem Steel Co. in Bethlehem, Pa., for special subgrade and shoulders. The

(Continued on next page)

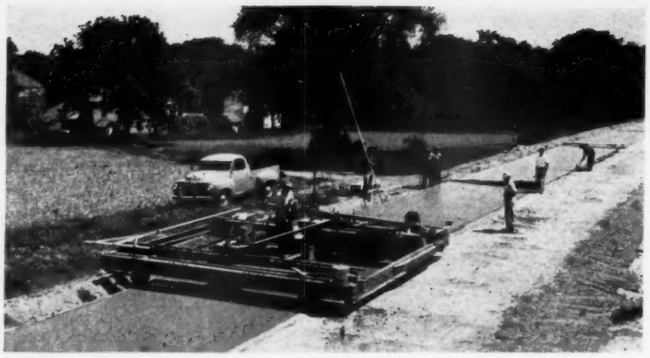
Reinforced Concrete On Slag Subgrade

(*Continued from preceding page*)

job called for about 56,000 square yards of special sugrade and 11,000 square yards of shoulder. The material was laid in two lifts and compacted with a 10-ton Huber roller.

When the grade was given its first shaping, the contractor brought in a Cleveland tractor-type Formgrader to prepare the base for the forms. About 5,000 feet of Heltzel 10-inch steel forms were required to keep work far enough ahead of the paver. With an air hammer to drive pins, over 2,000 feet of forms were laid each day.

As the forms were set, a Buckeye Finegrader followed behind to remove any excess material. Further fine-grading was achieved with a steel blade suspended from a 2-foot I-beam that was laid horizontally between cars riding the forms. After a light rolling with a 2-ton Huber, the grade was checked with a scratch board, then given its final smoothing with a hand roller.



A Koehring longitudinal float completes the paving equipment.

Contraction joints were placed every 61½ feet and expansion joints every 696 feet. Contraction joints consist of a ⅛-inch steel plate, with 1-inch dowels on 12-inch centers projecting 9 inches out on either side. Wire cradles running parallel to the joint on each side supported the ends of the dowels during construction. A metal cover on the steel plate protected the joint from being displaced by the paving machines.

Expansion joints consist of 1-inch-thick premolded material, with the same dowel spacing as on the contraction joints. However, ten sleeves, 3 inches long, were placed over the ends of the dowels on one side of the joint to permit movement of the slab.

Paving

The paving spread consisted of a Rex 34E dual-drum paver, a Blaw-Knox spreader, a Jaeger-Lakewood finisher, and a Koehring longitudinal float. Batch trucks dumped into the skip as concrete, carried out on the paver's 35-foot boom, was distributed in front of the spreader. Total mixing time was two minutes.

Except on the pour of the last lane, the paver worked outside the forms on the subgrade. In some cases, it required the full length of the long boom to pour beyond a completed slab.

Water was pumped to the paver from a 1,000-gallon tank truck that stayed with the paver. Another 1,000-gallon truck refilled the first with water from nearby creeks.

Because the wire-mesh reinforcing steel had to be placed 2 inches from the top of the 10-inch slab, the pouring was done in two operations. First, the paver and spreader poured the bottom 8 inches of a 61-foot block. (An up-and-down hydraulic adjustment on the revolving front screed of the spreader permitted the unit to strike off the top 2 inches of concrete.) When one block was poured in this manner, both paver and spreader moved back to the previous joint, workmen laid the reinforcing mats, the spreader raised its strike-off screed to the level of the forms, and the top 2 inches of concrete was laid. Concrete was vibrated with a Mall vibrator which was set on the back of the spreader.

Following closely behind, the double-screed machine continued the mechanical finishing as the longitudinal float prepared the surface for the hand finishers. Using contractor-developed long-handled finishing tools, workmen followed quickly to round joints and edges and burlap-drag the surface. Burlap mats were then laid over the fresh concrete and kept wet for 72 hours. A 1,000-gallon tank truck, with a perforated curved pipe projecting vertically from its side, sprayed water on the mats continually.

Batch Plant

Good's batch plant, located about two miles from the job, was near a main highway and easily accessible for material suppliers.

Because of a state specification requiring aggregates to be stockpiled at least 18 hours before being used, three storage pits were set up on each side of the Heltzel 3-compartment bin. While one Northwest

FIRST CLASS
Permit No. 280
(Sec. 34.9 P.L.&R.)
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

3c-POSTAGE WILL BE PAID BY

Contractors and Engineers
470 FOURTH AVENUE
NEW YORK 16, NEW YORK

FIRST CLASS
Permit No. 280
(Sec. 34.9 P.L.&R.)
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

3c-POSTAGE WILL BE PAID BY

Contractors and Engineers
470 FOURTH AVENUE
NEW YORK 16, NEW YORK

Contractors and Engineers - Request Card - Oct. '53

Please send me information on new products and/or catalogs described in the editorial columns of this issue, as circled below.

1	2	3	4	5	6	7	8	9	10	91	92	93	94	95	96	97	98	99	
11	12	13	14	15	16	17	18	19	20	101	102	103	104	105	106	107	108	109	
21	22	23	24	25	26	27	28	29	30	111	112	113	114	115	116	117	118	119	
31	32	33	34	35	36	37	38	39	40	121	122	123	124	125	126	127	128	129	
41	42	43	44	45	46	47	48	49	50	131	132	133	134	135	136	137	138	139	
51	52	53	54	55	56	57	58	59	60	141	142	143	144	145	146	147	148	149	
61	62	63	64	65	66	67	68	69	70	151	152	153	154	155	156	157	158	159	
71	72	73	74	75	76	77	78	79	80	161	162	163	164	165	166	167	168	169	
81	82	83	84	85	86	87	88	89	90										

Name _____ Title _____
(Please Print)

*Company or Gov't Dept. _____

Address _____

City _____ Zone _____ State _____

*

Listing of your Business Connection is essential for handling literature reque

---

Contractors and Engineers - Request Card - Oct. '53

Please send me further information on products shown in the Ad on

Page _____ Product _____ Adv. _____
(Advertisers Name)

Page _____ Product _____ Adv. _____

Page _____ Product _____ Adv. _____

Page _____ Product _____ Adv. _____

In addition I would like to receive information on the following:

_____

_____

Name _____ Title _____
(Please Print)

*Company or Gov't Dept. _____

Address _____

City _____ Zone _____ State _____

*

Listing of your Business Connection is essential for handling literature reque

crane kept the bin filled with material from one side, another crane stocked the opposite pits for the 18-hour storing period.

Sand was brought in by rail and then trucked to the plant. Both types of stone, supplied by the Bethlehem Steel Co., were also trucked to the plant.

The air-entrained cement was supplied by Lehigh Cement Co. and hauled from a nearby railroad siding in closed cement-trucks. It was batched in a Heltzel 800-barrel cement silo. The pneumatic batching equipment was powered by a Schramm portable compressor. Good used about eight 2-batch trucks for the two-mile haul to the paver.

A typical 1:2:3½ mix consisted of the following weights:

Sand	1622
3A Stone	1491
2B Stone	1491
Cement	827

The 2B limestone coarse aggregate had the following gradations:

Sieve Size	Per Cent Passing
No. 4	0–10
½ in.	20–50
1 in.	90–100
1¼ in.	100

The larger 3A limestone coarse aggregate had the following gradations:

Sieve Size	Per Cent Passing
1 in.	0–15
1½ in.	35–70
2 in.	90–100
2½ in.	100

Personnel

J. Habbyshaw was superintendent, and Z. Lee was concrete foreman for C. W. Good. R. E. Boyer was district engineer; E. H. Iobst, assistant district engineer; J. E. Krick, construction engineer; and C. S. Almony, assistant construction engineer for the Pennsylvania Department of Highways, which is headed by E. L. Schmidt, secretary of highways.

New Welder Features Wide Current Range

■ Wide current ranges are a feature of the new selenium rectifier welder announced by Miller Electric Mfg. Co., Appleton, Wis. Current ranges run from 3 to 300 amps to 125 to 750 amps. Other characteristics stressed are pulsating, magnetic amplifier circuit and new current-stabilizing coils for arc stability at all current settings, hand or foot remote control units that permit crater elimination, and micrometer amperage selection.

The improved range-selector switch and dual-unitized infinite current controls are also new.

For further information write to the company, or use the Request Card at page 18. Circle No. 15.

Scaffolding Equipment

■ A new bulletin listing applications of scaffolding equipment for masonry contractors has been issued by Waco Mfg. Co., Department KP, 3565 Wooddale Ave., Minneapolis 16, Minn.

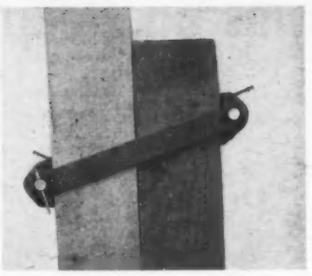
The literature illustrates components of various Waco scaffolding packages and shows various types of masons' jacks and allied equipment for masonry construction.

To obtain this literature write to the company and request Form MA-7, or use the Request Card at page 18. Circle No. 18.

Clamps for Shoring

■ A new shore clamp makes it possible to erect shoring without measuring and cutting lumber to length. The Quick-Way clamp holds two 4 x 4's so that they may be telescoped or extended to any desired height or length. The clamp consists of two non-slip grip shoes and a swinging side arm.

In typical shore erecting, two clamps are used to join a pair of 4 x 4's. The clamps are placed around the overlapping pieces of lumber so that one shoe is higher than the other. A nail is driven through the nail hole in the upper shoe only. The side-arm is locked



and the upper 4 x 4 can now be pushed up by hand to the desired height if the shore is not under a load. A jack may be used if the shore is under a load. When the shore is properly aligned, one firm hammer blow on the lower shoe of each clamp takes up the slack to keep the clamp from slipping. A nail is then driven in part way against the top edge of the lower shoe. This allows the top 4 x 4 to be raised farther, when necessary, to align the shoring. When the shore has been raised to the desired height, the clamp is tightened as before, and a nail is driven through the nail hole in the lower shoe.

The shore clamps are also furnished to fit dressed 2 x 4 lumber.

For further information write to the Quick-Way Clamp Co., 627 Denham Bldg., Denver 2, Colo., or use the Request Card at page 18. Circle No. 3.

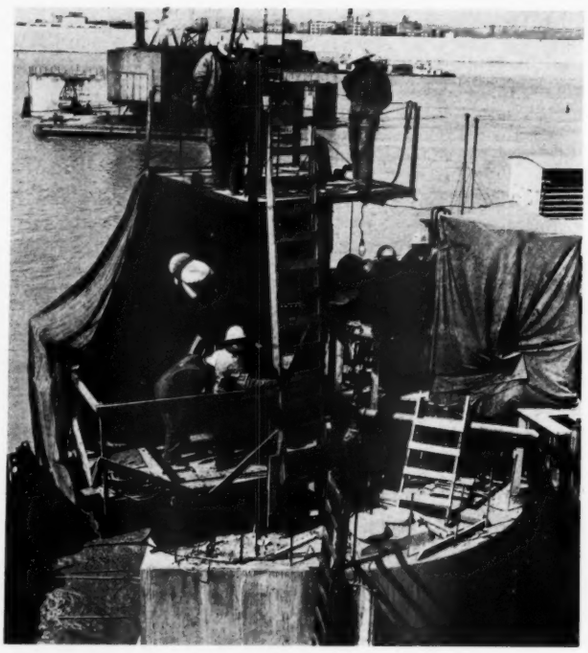
Air Problems on Deep Caissons for Bridge Piers

IN BUILDING four piers for the Paseo River Bridge, Kansas City, Mo., the joint contractors on the job ran into a familiar problem: how to secure efficient performance from compressed air drills operating in caissons.

The contractors, Massman Construction Co. and the Kansas City Bridge Co., both of Kansas City, Mo., had to work the drills in caissons under an anticipated maximum of 52 pounds of air pressure, since the job called for the piers to be sunk 100 feet below low-water level. The piers penetrate the shifting sand floor of the river, then go through shale to rest on Pleasanton shale.

On similar jobs, air for both caisson pressure and drills came from the same receiver, with air for pressuring the caissons drawn off through reducing valves. However, this system results in impaired air tool performance because of line losses and because drills have to exhaust against a back pressure. A solution tried previously, piping the tool exhaust to atmosphere, caused light hose to collapse under pressure, while heavy hose made the tools unmanageable.

Then the contractor, who selected a battery of skid-mounted Joy Model 630 portable compressors for the job, ran into another problem. In synchronizing the loading and unloading of individual machines in manifold, he found that the entire load fell on one or two machines. This occurred because the portable pilot valves are not sensitive enough or stable enough to maintain the required precise pressure settings.



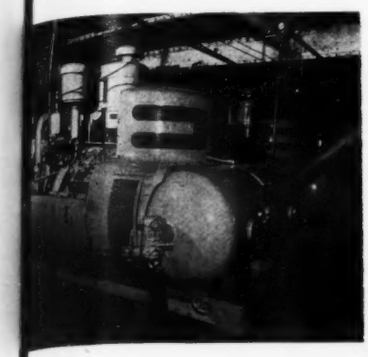
Excavation is carried on through this air lock. The air pressure is increased to 52 pounds maximum as depth increases.

Here, the contractor turned to the manufacturer. The compressor sales-engineering staff of Joy Mfg. Co. specified four barge-mounted Joy Model 630 portables for the job, with a slight modification of the automatic load controls on each compressor. A single electro-pneumatic control was installed, which loads and unloads the four machines simultaneously. Each load control is provided with two extra pet cocks, allowing the drills to be used singly in case the electric power supply for the compressors failed.

When the electro-pneumatic control is in normal use, the unloader section of each individual control is made inoperative by closing one of the extra pet cocks. However, the slowdown feature of the individual control is retained.

The system has proved itself ef-

Four Joy Model 630 skid-mounted portable compressors furnish air for caisson pressure. Compressor canopies are removed for better cooling.



fective in operation. Intake air from the main receiver is delivered to the skid-mounted Joy WGB-9 booster compressor at 100 pounds pressure. The compressor, in turn, delivers approximately 27 cfm at 175 pounds pressure to a separate tool line which runs into the caisson. This pressure is considered ample to maintain a 100-pound differential in the caisson. Engineers estimated that a drill requires 15 per cent more air against approximately 50 pounds back pressure than it does under normal conditions.

The booster operates only when tools are being used in the caisson. Since a high-pressure receiver bleeds excess back into the main 100-pound receiver through a regulating valve, an unloader is not needed.

As a safety precaution, the compressor barge is equipped with a hospital lock. Carbon monoxide detectors are installed on all receivers, and engine exhaust stacks are extended to minimize the danger of carbon monoxide in the caissons.

Fire-Pump Attachment Converts Chain Saws

■ A fire-pump attachment that fits the power unit of all two-man McCulloch chain saws has been announced. The attachment converts the saw into a portable fire pump with a capacity up to 250 gpm.

The pump is mounted on a wooden base and has a protective screen for the suction hose. The FPA attachment is the same pump as the company's Model 7-FP with a special adapter.

For further information write to McCulloch Motors Corp., 6101 W. Century Bldg., Los Angeles, Calif., or use the Request Card at page 18. Circle No. 25.

First Texas RMCA Meeting

The Texas Ready Mixed Concrete Association, with an active membership of 44 companies, held its first annual meeting in Austin. Elections and reports on legislation were the main features of the convention.

Officers for the new year include: Scott D. Clark, president; T. L. Amis and J. J. Randol, vice presidents; H. M. Lacy, Weaver Cunningham, W. A. Kelso, D. P. Wheat, Lawrence Fuqua, and N. L. Fox, directors.

An office has been established at 907 Congress Ave., Austin, Texas, with C. S. McLellan as executive director.

New Sprocket Chains

■ An improved line of drive and conveyor sprocket chains has been introduced by the Chain Belt Co., 4701 W. Greenfield Ave., Milwaukee 1, Wis. The new R, RX, and RR series replace the Rex Chabelco line of steel chains. The R and RX series are drive chains, and the RR series, conveyor chains.

Improvements include greater wear resistance and strength and closer tolerances. The new chains are easier to assemble and disassemble. They operate on standard sprockets.

For further information write to the company, or use the Request Card at page 18. Circle No. 99.

Diamond Core Drills For Foundation Tests

■ Literature on diamond core drills for foundation testing and soil sampling is available from E. J. Longyear Co., Foshay Tower, Minneapolis 2, Minn. The company offers frame-mounted models used for surface and underground work and exploratory and blast hole drilling as well as soil testing.

A wide range of models powered by gasoline, diesel, air, and electric motors are made. Drilling capacities range from 300 to 5,000 feet, with cores from $1\frac{5}{16}$ to $2\frac{1}{8}$ inches. The catalog also illustrates column-mounted models which are easy to move, set up, and operate underground.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 44.

New Grader Attachment Mounts on Tractor

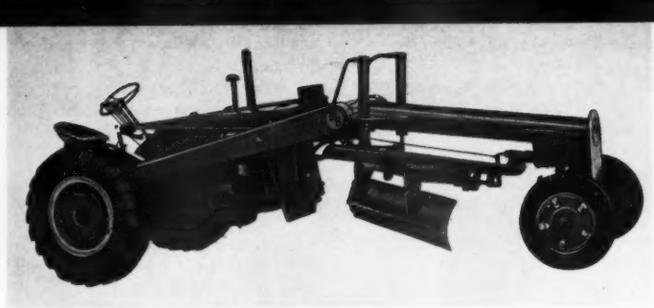
■ A new grader that fits the Case SI and DI tractors has been announced by the Meili-Blumberg Corp., 1615 Wisconsin, New Holstein, Wis. The M-B grader is attached or removed in less than an hour, leaving the tractor available for other jobs.

The grader frame is constructed of a heavy tubular section. The grader is mounted on the tractor so that the location and weight of the engine will make for better traction and more blade pressure.

The unit handles a 10-foot blade in 3 blade-pitch positions. The circle rotates into 5 operating positions and is hydraulically raised and lowered. Hydraulic circle turn is available as optional equipment.

A number of attachments, including a ⅜-yard front-mounted shovel, a berm lever, a scarifier, a bulldozer blade, and snowplows are available.

For further information write to the company, or use the Request Card at page 18. Circle No. 83.



The new Meili-Blumberg grader on a Case tractor.

Safety Flag for Cars

■ A safety flag introduced by the Wright Flag Co., Nappanee, Ind., may be clamped on top of the door of any car or truck cab. A weather-resistant spring holds the flagstaff rigid whether the window is opened or closed.

The banner, available in red gabardine, measures 10 x 6 inches. It is said to stand up under rain and sun.

For further information write to the company, or use the Request Card at page 18. Circle No. 124.

Line of Plant Accessories

■ A new bulletin covers the complete line of standard products made by the Stephens-Adamson Mfg. Co., 23 Ridgeway Ave., Aurora, Ill. Among items included are the Tel-level bin-level controls, and the Twistite bin valves. The bin-level storage control units are self-contained switches that are mounted near the top of bins to prevent overflow. The double-closure bin valve consists of two flexible rubber sleeves joined by a rotating collar. When the collar is rotated by hand or motor, both sleeves twist to cut off flow of material.

The catalog also shows the company's line of hand-operated and motor-powered winches, which includes various sizes for handling a wide range of lifting and pulling jobs. Five sizes of hand winches handle up to 2,000 pounds, and motorized winches are built to handle up to 6,000 pounds. Other products made by the company and shown in the catalog are belt conveyor carriers and cleaners. A roller-type holdback unit mounts on head shafts of belt conveyors and bucket elevators to prevent reversal under load in case of power failure.

This literature may be obtained from the company, or use the Request Card at page 18. Circle No. 142.

New Arc-Welding Machines

■ Over 20 different models of arc-welding machines are described in a new catalog from Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

Included in Airco's line of arc-welders are dc motor-generator and engine-driven sets, dc selenium rectifiers, ac machines specifically developed for Heliwelding applications, and a wide range of ac transformer welders. Also discussed in the catalog are various types of running gear, foot controls, and an automatic arc-welding head.

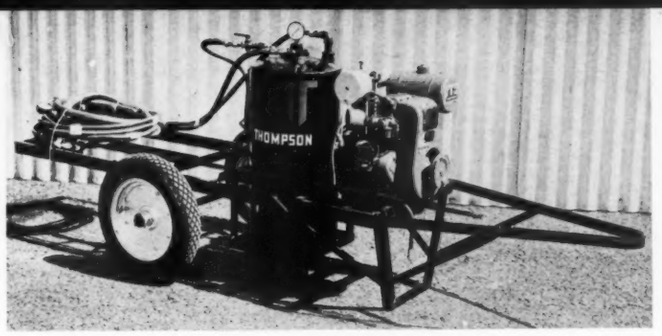
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 143.

Power Spray Machine For Curing Compounds

■ A power-spray machine, for use in curing concrete pavements, is shown in literature from the Thompson Materials Corp., 204 West St., New York 13, N. Y. The Model No. 300 sprays colorless membrane compounds, asphalt cutbacks, and emulsions.

The unit runs on a trailer with two pneumatic-tired disk wheels and has a 2-inch channel-iron chassis.

Power comes from a Wisconsin



engine through a direct connected air compressor. An air compressor tank, a 25-foot length of air hose, a 25-foot length of liquid hose, and an 11-foot spray bar are other accessories.

Mixing of the air and liquid occurs in the spray gun. The compressor supplies 50 to 85 pounds of air pressure to the gun. Round spray, flat spray, or solid spray is regulated by the choice of nozzles.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 93.

Hoist and Crane Hook Has Safety Device

■ A hook with a safety gate that locks automatically and will not open unless the pin is manually depressed is made by the E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif. The safety gate opens horizontally on the shank axle so that even a full hook load will not snag in loading or unloading. The manufacturer stresses the added protection afforded where derricks, hoists, and cranes are used.

The Bullard-Burnham safety hook is of drop-forged steel. Component parts are cadmium plated. The safety gate is of brass and is available with a return spring for automatic closing.

The safety hook is available in sizes No. 2 to No. 16A. Hooks with greater weight capacities are available on special order.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 66.

Dust Control Systems For Dry Drilling

■ Portable exhaust systems to be used with pneumatic rock drills are shown in literature from the Kadco Corp., 36-40 11th St., Long Island City 6, N. Y. The units remove dust and chips from the cutting edge of the drill so that the bit is constantly striking on virgin rock. The cuttings travel directly from the drill to a central filter hopper. Since the cuttings are not left in the hole to grind the gage of the bit on the circumference of the hole, less power is needed to rotate the steel. The quicker return of the piston permits more blows per unit of time.

The dust-control units are wheel mounted, self-contained, and according to the manufacturer, they are approved by the New York State Department of Labor for the control of injurious silica dust concentration. The dust travels directly from the drill to a center filter hopper. The Kadco systems are available in sizes from the small portable unit for a single drill to central plant installations capable of handling large drilling operations.

Machines shown in the literature include one for average size jobs where the use of one wagon drill or two rock drills is required. A larger model for two wagon drills or four rock drills is also illustrated.

The literature has a table listing standard sizes of dust collectors for surface work.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 11.

Tractor Equipped to Push-Load Scrapers

■ The Caterpillar D8 tractor has been adapted for pusher-loading work. The new unit is made up of the tractor, the No. 8S bulldozer, and the No. 25 cable control and is capable of head-loading large scrapers.

Among new features of the D8 pusher tractor is a more powerful engine. Caterpillar's D13000 engine has been modified to produce 150 drawbar horsepower at 1200 rpm.

Weight of the unit has been increased to 50,025 pounds for better pusher balance and increased traction. Standard equipment includes a special heavy-weight crankcase guard and track roller guards.

One of the outstanding features of the new unit is the tandem pusher frame attachment. By permitting the transfer of power from one tractor to another through the track roller frame, the destructive stresses imposed on the lead tractor's final drive is said to be avoided.

The pusher-tractor version of the Cat D8.

For further information write to the Caterpillar Tractor Co., Peoria 8, Ill., or use the Request Card that is bound in at page 18. Circle No. 63.

Dry Ice Used to Secure Samples of Quicksand

In order to secure accurate samples of quicksand from a river bed, the Oklahoma State Highway Department used dry ice in a procedure which George E. McCamy, department materials engineer, says is original as far as department engineers can determine. The samples were needed to ascertain how far dirt fills could be built out from each side of the South Canadian River and still be safe from shifting sand. This information, in turn, would determine the length of the bridge.

The problem was to find a method of taking samples without losing any sand or water from the quicksand. To get the samples, small tubes were forced into the sand, larger casings were inserted around them, and sand and water between the tubes were excavated and replaced with dry ice. The sample in the smaller tube was frozen by its casing of dry ice, so that when the tube was pulled from the hole, the quicksand was in the same condition as it was below the surface. Working with information supplied by the samples, it was found that dirt fills could be built on each side of the river to within 3,750 feet of each other. This gap will be spanned by the new $3,000,000 bridge which the highway department will build.

New Glaze Surfacer Protects Moldboard

■ A moldboard glaze that keeps wet snow from adhering to the metal surface and protects the snow plow moldboard from rust during idle periods is announced by the Norgahn Co., 406 11th Ave. S., Wausau, Wis. The new moldboard glaze has a beeswax base in a solvent that will not freeze at 65 degrees below zero. It evaporates quickly after application.

Coverage of the new glaze is approximately 600 square feet per gallon.

For further information write to the company, or use the Request Card at page 18. Circle No. 46.

Portable Space Heaters

■ The addition of several new models to its line of portable space heaters is announced in new literature from The Bica Co., 1170 N. State St., Girard, Ohio. The new Sonic-Ray heaters are the Model T, the Model W, and three units approved by the American Gas Association.

The Model T is rated at 85,000 Btu and is thermostatically controlled with an automatic safety shutoff. It is said to give safe, unattended operation and has a self-contained thermostat for maintaining a predetermined room temperature.

The Model W is a portable, combination water and space heater. It is rated at 85,000 Btu input with a 100-gph capacity at 125 degrees F.

The AGA-approved Models AD, AF, and AT are rated at 50,000 Btu input and may be used for permanent or semi-permanent installation.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 85.

"I hate to say it, Mack, but last night I couldn't put my kid's Erector set together!"

Device Transmits Voice But Minimizes Noises

■ A special mouthpiece that fits most telephones is said to reduce outside distracting noises substantially so that the speaker's voice will be transmitted clearly. The Confidencer, made by the Roanwell Corp., 662 Pacific St., Brooklyn 17, N. Y., resembles a telephone mouthpiece.

Unwanted noises are neutralized by directing them through special sound chambers to both sides of the diaphragm. The energy produced by the unwanted noise is thus cancelled out as the pressure on one side of the diaphragm counteracts the pressure on the other side. However, when one talks directly into the microphone, the sound unbalances the diaphragm acoustically so that the desired signal is transmitted in a normal manner.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 132.

Reinforced-Concrete Book

A new third edition of "The Theory and Practice of Reinforced Concrete", by Clarence W. Dunham, associate professor of civil engineering at Yale University, has recently been published.

The work contains an introduction to ultimate load design and the analysis of prestressed concrete members, together with the straight line theory. It is intended to give an undergraduate engineering student a working knowledge of design procedures, practical details, and the planning of construction. This revised edition includes recent developments in concrete technology, principles of planning precast concrete, and practical design problems.

The book, which sells for $7.00, is published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y.

Benn Elected by NCA

William R. Benn, safety engineer of The H. K. Ferguson Co., industrial engineer and builder, has been elected chairman of the safety committee of the National Constructors Association. The committee's purpose is to seek means to prevent accidents on members' construction projects.

Mr. Benn, a graduate of the South Dakota School of Mines and Purdue University, has been associated with the Ferguson organization for two years.

Choosing the Crusher For a Specific Job

■ A booklet that tells how to make the most efficient application of various types of crushers is available from the Pennsylvania Crusher Co., 1771 Liberty Trust Bldg., Philadelphia 7, Pa. The factors that influence operation, such as power consumption, parts wear, maintenance costs, and uniformity of product are discussed in detail. The booklet has a check list to help determine the best type of crusher for particular jobs. Five types of hammermills, jaw crushers, impactors, granulators, gyracones, Bradmills, Bradford breakers, Bradford hammermills, and several types of single rolls are discussed.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 88.

A New Holland forage harvester is used to spread straw mulch on a freshly seeded Washington-Baltimore highway by E. W. Picket, contractor, of Woodbine, Md. The machine spreads straw evenly in all directions. For further information write to New Holland Machine Co., New Holland, Pa., or use the Request Card at page 18. Circle No. 156.

A Noble automatic batch plant, owned and operated by Otto Ashbach & Sons, Corps of Engineers concrete contractor. By letting one main contract for aggregate production and concrete mixing, the Corps has centralized production and secured excellent control of the concrete.

1953: Alaskan

Plans for Alaska's military construction program start at the office of the Anchorage District, U. S. Army Corps of Engineers, at Fort Richardson.

By RAY DAY

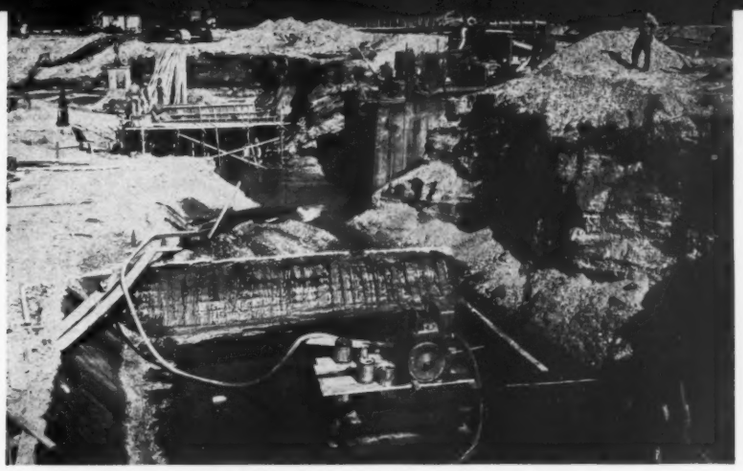
THE ALASKA STORY is deceptive. You'd be wrong to judge it entirely by the used-car lots in Anchorage or Fairbanks.

In many of the used car lots in these Alaskan construction boom towns are rows of automobiles: Fords, Chevvies, and a jeep or two, with an occasional Cadillac thrown in for class. Price tags are reasonable. If you're a construction stiff, you soon find out why. Most of the former owners are back in the States. They're broke. They're bitter. They're trying hard to forget the sky-high Alaskan economy which took their savings before they could find work.

But that's only one side of the picture.

Other men are kept busy by the biggest construction boom the Territory of Alaska has ever seen. The military defense program over-

Construction



Melting water is one of the special problems faced by contractors working in Alaska. Here, a Rex pump unwaters a foundation area and a crane places concrete.

This strategic arctic outpost is alive with construction as military and civilian programs are hurried forward

shadows everything else. Many of the trucks and pickups you see in Alaskan towns have familiar names like Patti-McDonald, Morrison-Knudsen, and Peter Kiewit Sons' Co. These companies and others like them are hurrying military defense work. You see new highways under construction, airfield maintenance crews at work, private buildings going up. Practically all this work hinges on the defense program.

But though Alaska's traditional industries don't, they're booming too. Placer-mining for gold goes on unchecked. Prospectors have uncovered new deposits of mercury, silver, lead, antimony, copper, and coal, and many of these deposits have been opened up. Salmon fishing is still big business. Pulp mills have opened at Ketchikan, and a Japanese firm is starting negotiations

(Continued on next page)

The Story of Alaska: 1953 Construction

(*Continued from preceding page*)

for another one at Sitka, so that the timber there can be harvested. Navy exploration crews have located oil below Point Barrow, and Phillips Petroleum Co. and other Stateside outfits are moving in with geophysical crews. This part of the picture may have some military significance. Milking tourists, on the other hand, is still a part of the civilian picture.

Pick up an Alaskan newspaper any day and you can find reports of an unlimited construction boom, pleas by a Government official for more Government work, and predictions of an Eisenhower depression. When the Army's big docks at Whittier burned down recently, with damage estimated at $20,000,000, the disaster was supposed to knock a hole in Alaska's economy.

What causes these phantom panics in the midst of plenty?

Uncertainty The Key

Possibly the key to the whole thing is uncertainty. In the last 200 years, uncertainty has dominated every phase of Alaska's development. When Vitus Bering, Captain Cook, and early Russian explorers visited this place, the threat of starving and freezing to death was always present. In a sense, that threat still exists. Construction men fear anything which causes even a temporary shutdown of work. City fathers in boom towns in Alaska feel economic uncertainty will accompany an improved world political situation and mean the curtailment of at least some of the defense work. Privately, they admit that Alaska's vast resources are a sounder basis for ultimate growth than any amount of temporary Government spending.

Alaska is a rugged land where one bad year can ruin a man or his business. The big dock fire at Whittier, for example, set construction work back enormously because Army ships, loaded with materials and supplies, then had to berth at Seward, where docks were already crowded with vessels of Alaska Steamship Lines. Secretary of Defense Charles Wilson's short-freeze order last spring created enough uncertainty to prevent many contractors from bringing materials and equipment in from the States for six weeks, and the Alaskan construction season is so short that a sizable percentage of it was gone before projects were approved.

Almost everything that's done in Alaska is done against a background of traditional uncertainty. The only certain thing is a fear of what will happen next. But in spite of it, today's biggest construction boom in Alaska's history shapes up like this:

Military Construction

The general military program in Alaska is a well integrated network of many services, with the entire military command under Lieutenant General J. H. Atkinson, U. S. Air Force, Commander-in-Chief, Alaska.

Under General Atkinson's command are the Army, Navy, and Air Force. U. S. Army (Alaska) headquarters includes a main Army center called Fort Richardson, and its construction is one of the bigger projects for the U. S. Army Corps of Engineers, Anchorage District. Navy operations, directed from the Alaskan Sea Frontier headquarters at Kodiak, include a variety of defense and patrol activities. U. S. Air Force activities are directed by Alaska Air Command at Elmendorf Air Force Base near Anchorage, which with Ladd and Eielson Air Force Bases are the principal defense fields.

The Corps of Engineers' work at many of the bases goes back to the defense years immediately preceding World War II. The Corps started construction on several bases at that time, and participated in work on the Alaska Highway and oil and gas pipelines. Its activities today are simply a continuation of that program.

Hundreds of millions of dollars have been put into Alaskan military construction since World War II. At that time, most of the work was concentrated in the Aleutians. The present program, designed to meet modern military tactics, has works scattered thousands of miles apart throughout the Territory. Last year's Corps of Engineers work totaled $360,000,000 in construction.

Typical base projects include concrete barracks for 200 and 500 men, power plants, airport control towers, hangars, runways, hospitals, communications networks, warehouses.

water treatment facilities, telephone exchanges, houses, and recreation clubs for enlisted and officer personnel. A typical roster of contractors at work includes Morrison-Knudsen Co., Inc., Peter Kiewit Sons' Co., Patti-MacDonald, J. H. Pomeroy, Haddock Engineers, Boespflug Co., J. B. Warrack, S. Birch & Sons, Lytle & Green, Drake Puget Sound, Reed & Martin, Hopper Co., and M-B Construction Co.

Bidding is rapidly becoming more and more competitive. In 1951, an average of four contractors bid on each job. By 1952, the number had jumped to an average of ten bidders per job, and by this year the figure was even higher.

U. S. contractors have reversed traditional Alaskan thinking in many respects. For example, contractors soon demonstrated the feasibility of completing the outer portion of a building during the six-month summer construction season, then doing inside finish and utility work in the winter. A few contractors have even built small emergency buildings, under tent protection, with salamander heat, during the bitter winter months.

By working out such details, contractors have helped the Corps of Engineers to move along rapidly with military work This feat can hardly be minimized, for American contractors face precisely the same weather difficulties in winter as the military. Temperatures of 20 to 25 below zero are recorded regularly at Anchorage; 50 below is not exceptional for Fairbanks; 73 below has been recorded at Northway; 83 below at Snag, Yukon Territory; and Verkhoyansk, Siberia, has had the all-time record, 94 degrees below zero. Fortunately, American contractors have no work under way at Verkhoyansk.

But even if temperatures do not drop this low, mechanical problems multiply as air temperatures decrease. Storage batteries deliver only one-sixth their rated power at 20 below zero. Lubricating oils, even of the lightest weights, congeal at extremely low temperature and must be diluted with gasoline before engines can start. Anything standing outside until it becomes cold soaked is a problem. Air Force studies illustrate that graphically. For example, using 55 degrees above zero as a starting point, a 50 per cent increase in man hours is the price for doing the same amount of work at zero. At 20 below, the increase is 75 per cent. At 40 below it jumps to 100-110 per cent, and below that, outside work virtually ceases.

Because of its rush nature, the military construction program feels the effect of all these conditions more than other types of work. In addition, it faces special mobilization, supply, shipping, weather, and labor difficulties.

To counteract these difficulties and expedite military contracts, the Corps of Engineers has centralized some work. An example is the central testing laboratory at Anchorage, which relieves contractors of the responsibility for many tests. In addition to normal acceptance and investigative tests, the laboratory is equipped to establish concrete mix designs, plan bituminous mixes, analyze water for industrial or domestic use, and to do similar diversified testing.

The Corps of Engineers has also centralized its concrete work by letting aggregate production and concrete mixing under one main plant and permitting it to supply contractors working in the vicinity. The scheme gives the engineers excellent control in a number of cases, including those where forms are inadequate and where pours of high priority need to be made. At the present time, an extensive Cedarapids crushing-screening plant is being operated near Elmendorf AFB by Otto Ashbach & Sons. They produce the concrete materials, proportion through a Noble automatic batch plant, and haul to the jobs by Dumpcrete bodies on Ford trucks. The terms on which these deliveries are made are stated in job specifications. The Government does not attempt to furnish concrete for cement blocks or concrete pipe.

Commercial vendors, who have private storage capacity in Alaska for about 75,000 barrels of cement, usually have Government-inspected cement available. Storage is adjacent to water and rail shipping, and the cement is available in either bags or bulk. Rock left in the wake of glaciers provides aggregate and is usually available near all the job sites. In a few cases, the Government provides aggregate by railroad or truck, without charge to the contractor.

(Continued on next page)

The Story of Alaska: 1953 Construction

(*Continued from preceding page*)

Although the practice now is on the wane, it was customary for the Government to furnish various pieces of rental equipment, spare parts, and even construction materials. However, construction materials are supplied only as "government furnished property" and must be incorporated into the applicable project.

Construction work on military bases under Corps of Engineers supervision is done usually under lump sum contracts, based on competitive bidding, and is awarded following a 30-day period in which the work is advertised. To give the contractors time to buy materials and mobilize equipment, many contracts are let in January, February, and March, so that the full six-month summer work season can be used to best advantage.

Several days prior to the appearance of plans and specifications for a job, an advance notice of work to be let is mailed to all firms appearing on bidders' lists in the Anchorage District office. These lists are composed of firms which have requested their names to be so included.

Specifications for each job are arranged in four parts. Part 1 is a brief general description of the job. Part 2 covers general conditions normal for construction of government contracts. Part 3 covers items relative to the commencement and completion of work, including drawings, inspection, and payments. Part 4 covers all technical provisions applicable to the particular job.

Partial payments are made monthly and are based on material delivered to the site and preparatory work done. In making these payments, ten per cent of the estimated amount is retained until the work is completed and accepted. However, the District Engineer has authority to make payments in full, if progress has been satisfactory, after the mid-point of a job has been reached.

The Corps of Engineers also maintains construction camps at Elmendorf AFB, Ladd, Eielson, and Whittier, for housing and messing contractor forces. The operation and maintenance of these camps is under a Government service contract, administered by the Government, and relieves contractors of problems not connected with construction. Specifications usually require the contractor to use these setups if they are nearby. Currently, specifications ask a contractor to guarantee a minimum number of man-days camp occupancy at the rate of $5.75 per man-day. The guarantee equals five per cent of the contract price. While camp rules and regulations are under the military, contractors have representation on the Camp Advisory board.

Army Civil Construction

Although most of the big multi-million dollar jobs are military, the Corps of Engineers is also engaged in a smaller, much-needed civil works program. The first jobs were started back in 1902 and have accelerated gradually over the past 15 years. About 100 projects have now been studied, with 61 qualifying for favorable recommendation on the basis of their feasibility and benefit-cost ratios. Such projects include flood-control works; river, harbor, and waterfront improvements; hydroelectric works; and dredging.

The jobs have not been large. For example, $7,300,000 covered 22 harbor and flood-control projects. But they point the way toward bigger improvements when Alaska grows. High on the civil works agenda is a major harbor improvement at Anchorage. It will be quite an undertaking, since Anchorage has a 37.7-foot maximum tide range, the second highest on the North American continent. The Anchorage waterfront job consists of a 1,420-foot extension to the existing wharf and protective breakwaters, costing about $8,000,000. Some $28,300,000

A workman checks the grade of a pipeline. Groundwater is high everywhere in the territory.

is being recommended for future civil projects.

In 1948, Congress authorized the Corps of Engineers to make a major study of all water resources in Alaska. The job is 68 per cent complete, and it looks promising for the future. Flood-control projects for the protection of Juneau and Fairbanks are also on the drawing boards.

One of the potential power sites uncovered in that study would produce 7,000,000,000 kilowatt hours of power a year at a cost of 3½ mils per kwh, exclusive of highway relocation in the vicinity. The site is on the main stem of Copper River, about seven miles below the mouth of the Chitina River and the village of Chitina. Threading through the Copper River valley is the abandoned Copper River and Northwestern Railroad, a relic of former copper mining operations, which is now being turned into a modern highway from tidewater at Cordova to Chitina. From there, the 39-mile Edgerton cutoff connects with Richardson Highway. Parts of this highway will require relocation through rugged terrain, and access will have to be given the currently inactive McCarthy mining district.

Other Civil Works

Other Alaskan civil works are also tied to some extent to the military program. Even private housing operators hope for more military construction. A syndicate plans construction of a 100-room hotel at Fairbanks, and there seems to be no question concerning its financial soundness if military work continues.

The U. S. Bureau of Reclamation has embarked on its first major Alaskan construction venture: the Eklutna hydroelectric project, which will furnish 30,000 kilowatts for the city of Anchorage and to two local co-operatives. If Alaska continues to grow, it's a fair guess that the USBR will continue to rate a place in the planning of future projects like this one. Details of the Eklutna project will be found in an article on page 50 in this issue.

Alaska district engineer of the Corps of Engineers is Colonel Louis H. Foote. He not only has jurisdiction over military construction, but also supervises Alaska's civil works program.

The Department of Agriculture, through its U. S. Forest Service and the Soil Conservation Service, is also quite active in the Territory. National forests are administered through the Forest Service, while SCS experts are conducting experiments to extend Alaska's agricultural production.

At the present time, construction operations of the Alaska Railroad, a U. S. Government activity under the Department of Interior, are at a standstill. The railroad was modernized several years ago to handle its optimum freight, so that now it depends primarily on revenues. Aside from sporadic improvement jobs and routine maintenance, Alaska Railroad can be disregarded as a construction agency.

Alaska's highways are beginning to expand now because the Alcan Highway has opened up new vistas to Statesiders. About 95 per cent of highway construction is under the supervision of the Alaska Road Commission, another Department of the Interior subsidiary. Construction of highways through national forests and monuments is supervised by the U. S. Bureau of Public Roads, a Department of Commerce subsidiary. Most of the extensive heavy grading jobs finished several years ago have now settled out, and the surfaces are being paved, as much as 50 miles under a single contract.

Plenty of other miscellaneous work is under way. The Navy is working on its facilities, new mines are opening up, and the beginning of a real timber industry is in sight.

Labor Prices High

From the time of the Klondike and Dawson gold strikes, it has been fashionable for Alaskan prices —including labor's wages—to be out of all proportion to prices anywhere else. Despite this, or probably because of it, few construction men leave Alaska with much money. Living costs are high, and entertainment costs are higher.

A dozer operator gets $3.54½ with time-and-a-half for overtime under prevailing union rules. The operator of a 5-yard shovel gets $4.19½. Most labor is $3.06 an hour. A carpenter rates $3.56½. There was a time when all crafts were guaranteed 173 hours of work a month, but that was when labor was recruited in the States. Now that men flock to Alaska each spring, labor is so plentiful that hiring and firing conditions similar to those in the U. S. prevail. Many men this year and last year left Alaska without finding work. The used-car lots and hock shops are filled with their last possessions, given up to pay their passage.

Outlook Bright

Despite this, Alaska's outlook continues to be good. As far as

(*Concluded on next page*)

The Story of Alaska: 1953 Construction

(*Continued from preceding page*)

military construction is concerned, enough money has already been appropriated to keep the wheels rolling two more years. In view of President Eisenhower's post-Korea statement, "we have won a skirmish in one battle; we have not won world peace", the only rational conclusion is that Alaskan military work must continue. An extremely high percentage of these projects stood up under scrutiny of the most exacting kind when they were re-examined by Secretary of Defense Wilson.

The real Alaskan old-timers—men who know how to get along with a bit of prospecting, a small truck garden, and maybe a moose once a winter—will tell you Alaska's future lies in her forests, mines, and fishing industry. They look with misgiving at the hopped-up boom towns, high prices, zooming divorce rates, heartbreaks, and glutted used-car markets. They may be right.

But perhaps all these things represent a price Americans are paying so that Alaska might have a chance to develop her resources. Is not that the traditional course of American history?

Machinery Storage Hut Has Telescoping Walls

■ A hut-like storage building made up of a series of independent, identical sections mounted on a track is announced by the Yard-Stor Shelter Co., 19256 John R, Detroit 3, Mich. The sections of the shelter tilt to accommodate lighter equipment and telescope so that heavy machinery may be moved in by crane. When the machinery is in place, the shelter sections are simply set over it.

The ribs and frame of the building are constructed of trussed and bridged tubing and covered with corrugated metal, fiber glass, or other material. Individual sections can be used without the track to provide temporary shelter for single pieces of machinery. The shelter sections can also provide all-weather protection to workmen by sheltering them while they are working on excavations, manholes, tunnel openings, and especially in pipe and conduit-laying operations. The company estimates that up to six sections can be nested on a single truck to be transported to the job location.

For further information write to the company, or use the Request Card at page 18. Circle No. 108.

Deluxe Saw & Tool Moves

The Deluxe Saw & Tool Co., a subsidiary of Rockwell Mfg. Co., Pittsburgh, Pa., is transferring its headquarters and out-of-state manufacturing facilities from Chicago, Ill., and Columbus, Ohio, to its plant in High Point, N. C.

The company, which manufactures carbide-tipped circular saw blades and other tools under the trade name Karbide King, will maintain its plant location in Chicago as a service and repair center and as midwest sales headquarters. Alfred G. Feldmann is general manager of the subsidiary.

Heat-Directing Panels For Concrete Batching

■ Its oil-burning heat machine is now available with heat-directing side panels, according to the Fageol Heat Machine Co., 5725 Mt. Elliott Ave., Detroit 11, Mich. The steel panels cover the heat outlets of the Model PW-189 portable heater and can be used singly or in pairs to direct heat as desired. They are made to attach easily.

With the new panels, the machine, which ordinarily forces out heat in three directions, will concentrate its 189,000 Btu in one direction only. This feature makes the heater more suitable for such applications as heating construction machinery, warming valves and tanks, de-icing machinery, and thawing pipes and frozen ground.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 126.

Shovels and Cranes

■ A new bulletin describes the Lorain 80 series of power shovels and cranes. The shovels are in the 1¾-yard class.

The bulletin covers design and construction features and includes cutaway pictures of individual working parts. Among the features illustrated are the roller bearing-mounted swing shaft and hoist drum, the hydraulic coupling which prevents shocks and stalling in shovels, and the combination third-drum and precision-boom lowering device for cranes.

Air controls, now available on this series, and a choice of crawler sizes and front-end equipment are also described.

To obtain this literature write to the Thew Shovel Co., 28th St. and Fulton Road, Lorain, Ohio, or use the Request Card that is bound in at page 18. Circle No. 68.

Covers Prevent Bond In Prestress Cables

■ Three new developments concerned with bond prevention in post-tensioned prestressed-concrete structures have been announced by Anchor Plastics Co., Inc., 36-36 36th St., Long Island City 6, N. Y.

A new split tubing with corrugated overlap prevents bond over twisted wire cables. The tubing is said to be easily applied, and so reduces application labor costs. It is suitable for most applications using wire rope as well as for parallel wires.

Another bond-prevention device is a 4-inch-wide strip, spirally wrapped around groups of parallel wires or rods. It requires no other sealing. Double thickness is ordinarily specified for this method.

The third product is a thin-walled tube for steel rods and bars.

For further information write to the company, or use the Request Card at page 18. Circle No. 95.

Ripper-Type Cable Layer

■ A ripper-type underground cable layer, available in two sizes, is illustrated in a folder from F B. Ryan, Chariton, Iowa.

Model B cuts up to 36 inches deep and lays cable up to 1½ inches in diameter. Pulled by a tractor, it requires from 20,000 to 30,000 pounds drawbar pull. Model C lays cable up to 2⅜ inches in diameter to a maximum depth of 42 inches and requires a drawbar pull of 25,000 to 35,000 pounds.

The cutting blade can be adjusted to any required depth while the unit is in motion. Hydraulic cylinders raise or lower the blade.

A small cable reel can be mounted on the machine, and a cable-reel trailer may be used for large reels.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 117.

N. J. Superhighway Gets Toll Barriers

A centrally located statistical recorder which will count, record, and classify types of vehicles passing toll stations in either direction, is one of the special features of barrier-type toll equipment to be installed on New Jersey's Garden State Parkway. Another device that will be used on the 165-mile superhighway is an automatic cash totalizer, which will record the amount collected for each type of vehicle, then add the sum to a previous total.

The toll-collection equipment and toll booths will be manufactured and installed on the road by Taller & Cooper, Inc., Brooklyn, N. Y., under a contract totaling more than $1,500,000.

This barrier-type equipment, similar to that used on bridges and tunnels, will be erected at 16 different stations. One barrier will be erected for each traffic lane at each collecting station on the four and six-lane divided highway. Some of the barriers will be erected across the highway, while others will be located on approach and exit ramps.

Under the barrier-type system, the driver will pay a cash fare at certain barrier points, rather than paying for mileage traveled at the point of exit. In addition to utilizing less right-of-way width than the interchange system, the New Jersey Highway Authority feels that the system will break the monotonous drive for the motorist and allow him to get detailed directions and advice on highway conditions from toll collectors.

Engine Pre-Heaters for Diesel and Gas Units

■ Electric pre-heaters for cold-weather operation of diesel and gas engines are shown in literature from Kim Hotstart Mfg. Co., W. 917 Broadway, Spokane 1, Wash. The device plugs into any electrical outlet and through a percolator-like action keeps the engine ready for instant starting even in sub-zero weather.

The attachment is said to save on warm-up time, engine wear and maintenance, battery life, fuel consumption, and machinery storage costs. The catalog illustrates typical installations and gives specifications for units for various sizes and types of engines.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 84.

Materials Dryer Line

■ A line of materials dryers is illustrated in literature from the Denver Equipment Co., 1400 17th St., Denver 17, Colo. The Denver Standard dryers, offered in complete installations from burner to stack, feature dependable drives, functional flights, sturdy thrust rolls, and positive seals. The unit has controlled burners.

Typical drying data is given for a variety of materials in dryers from 2 x 12 feet to 10 x 100 feet in size.

To obtain this literature write to the company and request Bulletin No. D4-B3, or use the Request Card at page 18. Circle No. 128.

Access Road Built For Camp Lejeune

Finishing machines, working together, speed road job for U. S. Marine Base in North Carolina

A pair of Barber-Greene finishers pave the two 11-foot lanes on the access road. Working close together, the machines insured a hot, tight joint along the center line. *C. & E. Photo*

MAJOR CONSTRUCTION PROJECTS to improve transportation facilities at the U. S. Marines' Camp Lejeune, N. C., include a new 5½-mile-long access road. It extends from the industrial area of the big base to State Highway 172, on the direct coastal route between Wilmington and Morehead City, the two principal seaports of North Carolina.

Camp Lejeune is located along the banks of the broad New River, just before it meets the Atlantic Ocean on the state's southeastern shore. It is approximately 50 miles up the coast from Wilmington. Heavy traffic in the area often caused cars to line up for miles at the main gate, just off U. S. Highway 17. The new access road not only relieves this congestion, but also cuts off about six miles for easterly traffic and serves the maneuvering area where the Marines are trained.

Construction at the base is under the supervision of Vincent G. Lauters, CDR (CEC), U. S. N., public works officer, Navy Department, Bureau of Yards and Docks. The $271,832 contract for the access road was a joint venture of the Goode Construction Corp., Blythe Bros Co., and Harrison-Wright Co., of Charlotte, N. C. Blythe Bros. Co. was the operating contractor.

Muck Overruns

The access road runs on an almost east-west line. Some 54 acres of land had to be cleared, but in the fairly flat terrain, the cuts and fills never exceeded 5 feet. Drainage turned out to be the biggest problem, since it was difficult to conduct water away from the roadbed in this level coastal area.

About 24,000 yards of material in roadway excavation turned out to be muck, which had to be replaced with suitable backfill. The muck overran considerably, since only 9,000 yards was included in the original estimate for this item. In one section, the deposit of muck extended for 2,300 feet along the line of the new highway. Loamy soil for the backfill and roadbed embankments came from eight borrow pits. The haul from one pit was 3,500 feet.

The contractor used a Lorain dragline in excavating the muck and a fleet of four Tournapulls for the long-haul dirt work. Short hauls were handled by two LeTourneau Carryalls and a Bucyrus-Erie scraper, all pulled by International crawler tractors. One section of muck, 1,700 feet long, was removed with dynamite—the charges being extended through the soft material down to solid ground.

An 80-foot right-of-way was pro-

The rear finisher pulls a flat steel box, which seals the center line joint and smooths irregularities. *C. & E. Photo*

With the exception of the fuel oil pump, the Simplicity pugmill asphalt plant is entirely steam-driven, with steam supplied by the Lucey boiler at right, foreground. The aggregate stockpile is at left.
C. & E. Photo

vided for the access road. After a pair of dozers and a motor grader had brought the roadbed to grade, a stone base-course of crusher-run material was laid 23 feet wide and 4½ inches thick. The Superior Stone Co., of Belgrade, N. C., supplied the stone, which was delivered by truck after a 14-mile haul.

The 23-foot stone base is the foundation for the 1½-inch bituminous concrete surface, laid to a width of 22 feet. The pavement has a 2-inch center crown, and is flanked by 8-foot shoulders that slope at the rate of ½ inch to the foot. Cut and fill slopes are 4 to 1. In cuts, this slope extends for 7 feet to a ditch, 2 feet wide and 2 feet 3 inches deep; back slopes in cuts are 3 to 1. From the edge of pavement to the toe or top of slopes, the roadside was covered with 4 inches of topsoil and then seeded.

Tank crossings of reinforced concrete were constructed at five locations in the road. Strips 20 feet wide were cut out of the black-top pavement and stone base and replaced with concrete 9 inches thick at the center and 12 inches thick at the ends. The reinforcing was laid 3 inches from the bottom of the slab. It consisted of ⅜-inch-round steel bars which were laid on 14-inch centers both ways to provide a strong mat. The corners of the concrete strips were further reinforced with angle irons to prevent damage by the heavy tanks.

Bituminous Paving

The Barrus Construction Co., Inc., of Kinston, N. C., did the final shaping of the stone base for the general contractor, rolled it with a Galion 7-ton tandem roller, and also laid the bituminous concrete pavement. Barrus set up a Simplicity, Model A, 1-ton pugmill asphalt plant outside the base to supply the hot mix, which consisted of stone, sand, mineral filler, and AP-3 asphaltic cement with an 85-100 penetration.

Crushed stone, graded from ⅜-inch to No. 8, came from the Superior Stone Co. at Belgrade, N. C., Local pits supplied the sand. The mineral filler was furnished by the James River Hydrate & Supply Co., Inc., of Buchanan, Va. Bitumen and fuel oil were delivered to the job in tank trucks from the Morehead City depot of the Asphalt & Petroleum Co., Inc., of Kinston, N. C. A vertical tank at the plant held a 22,000-gallon supply of asphalt, while fuel oil was stored in a 12,000-gallon horizontal tank.

A ¾-yard crane with clamshell bucket charged the receiving hopper

(Concluded on next page)

Access Road Built For Camp Lejeune

(Continued from preceding page)

at the plant with sand and stone. A 30-foot cold elevator fed the aggregate into a double shell 9 feet long and 8 feet in diameter dryer, which was heated by a Ray burner. The heated material then was raised within an enclosed 45-foot hot elevator to the screens and bins. Aggregate, bitumen, and mineral filler were weighed and mixed in the pugmill between 45 and 60 seconds.

Run by Steam

An unusual feature of the plant was that it was driven entirely by steam with the exception of the fuel oil pump, which was powered by a gasoline engine. A Lucey 150-hp boiler, heated by an oil-fired Ray burner, supplied steam through a 4-inch line to an old but efficient steam engine. This engine, in turn, operated all the plant's moving parts, from the aggregate feeder to the pugmill.

The weights of a typical 1-ton batch of plant mix follow:

Stone	700 lbs.
Sand	1050 lbs.
Mineral filler	100 lbs.
Asphaltic cement	150 lbs.
Total	2,000 lbs.

Gradation of the aggregate in the job mix was:

Sieve Size Passing	Retained	Per Cent by Weight
½-inch	.....	100
½-inch	No. 4	10–35
No. 4	No. 10	5–25
No. 10	No. 40	15–40
No. 40	No. 80	10–30
No. 80	No. 200	5–30
No. 200	.....	4–10
Bitumen	.....	7– 9.5

A fleet of 15 trucks, holding 6 tons each, hauled the hot mix an average of nine miles to the job. The mix was laid at a temperature between 275 and 300 degrees F by a pair of Barber-Greene finishers, one working slightly ahead of the other in paving two 11-foot lanes. This procedure of keeping the two machines close together insured a hot and tight joint along the center line. The seal at this joint was made even more positive by having the rear finishing machine trail along a heavy steel pan or box measuring 3 feet long and 2 feet wide. This weight smoothed over any minute irregularities while it sealed the adjacent lanes together. The 1½-inch surface course weighed 165 pounds to the square yard and was compacted by a Galion 5-ton tandem roller.

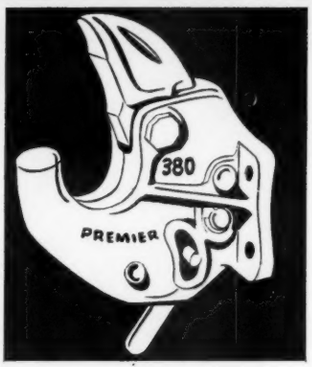
Quantities

Major items in the access road contract included the following quantities:

Clearing	54 Acs.
Excavation, common	140,000 cu. yds.
Excavation, borrow	73,000 cu. yds.
Excavation, drainage ditches	10,000 cu. yds.
Excavation, muck	24,000 cu. yds.
Reinf. conc. pipe, 18 to 30-inch	604 lin. ft.
Corr. metal pipe, 77 x 56-inch	180 lin. ft.
Stone base course	9,400 cu. yds.
Asphaltic concrete surface course	75,100 sq. yds.
Topsoil	25,500 cu. yds.
Seeding	50 Acs.

Blythe Bros. was represented on the project by Bill Robinson, superintendent, while L. T. Vick was superintendent for Barrus Construction Co.

For the Navy Department, Bureau of Yards and Docks, Commander Vincent G. Lauters is public works officer in charge, with John S. Andrews, supervisor of construction.



Truck-Trailer Hitch

■ A new medium-duty truck-trailer hitch is announced by Premier Mfg. Co., 409 S. W. 13th Ave., Portland 5, Ore.

Model No. 380 is a solid pintle-type hitch that accommodates a 2-inch drawbar eye. The hitch has a breaking strength of more than 90,000 pounds and weighs 27 pounds.

A heavy-duty version, the No. 480, will accommodate a 2½-inch drawbar eye. It has a breaking strength in excess of 150,000 pounds and weighs 37 pounds.

The hitch features a new locking mechanism which prevents false-locking, according to the manufacturer. The latch will raise to the open position automatically if locking is not completed. If the latch stays down, the hitch is securely locked.

The hitch is operated with one hand. In the open position an unrestricted opening is provided, making it easier for the operator to engage or disengage the drawbar. The locking mechanism is simple to clean, and all wearing parts can be replaced without removing the hitch from the truck.

For further information write to the company, or use the Request Card at page 18. Circle No. 16.

Diesel Crawler Tractors

■ Diesel-powered Allis-Chalmers crawler tractors are illustrated in literature from Allis-Chalmers Mfg. Co., Milwaukee, Wis. A spread devoted to each model consists of a cutaway view of the tractor showing its internal mechanism and several photographs of the unit in action.

Three of the tractors are rated at 40, 72, and 109 drawbar hp, while the largest unit delivers 175 net engine hp.

This literature may be obtained from the company, or use the Request Card at page 18. Circle No. 62.

New Crushing Plant And Screening Unit

■ A new in-line crushing and screening plant has been added to the line of portable plants made by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. The in-line feature means that the basic material flows longitudinally along the plant. The material is fed into the rear and discharged at the front end.

The Model 35-S plant consists of a 1036 jaw crusher, a 3024 double-roll crusher, a 2½-deck vibrator screen, and the necessary conveyors. Included in the plant is a 30-inch mechanical feeder, or a 30-inch x 40-foot swivel feed conveyor to the plant conveyor. A 16-inch x 6-foot sand reject conveyor is optional.

The Pioneer Model 35-S crushing and screening plant.

All units are assembled on a welded steel truck frame which in turn is mounted on a rear equalizer and single front dolly that is supported on 12 pneumatic tires.

Total weight of the plant varies between 56,350 pounds and 58,550 pounds, depending on whether a bolster with wheels or a semi-trailer hitch is used on the front end. Travel length of the plant with the delivery conveyor folded is about 39 feet. Travel width is 8 feet 10 inches and height is 12 feet 6 inches. The manufacturer states that the plant was designed for areas where weight restrictions are severe and where frequent and rapid moves are necessary. The plant can be pulled in and out of a pit without dismantling or removing conveyors or other accessories.

For further information write to the company, or use the Request Card at page 18. Circle No. 4.

Line of Front-End Loaders

■ The line of Drott front-end shovels available for International crawler tractors is shown in a booklet from the Drott Mfg. Corp., 3481 W. Wisconsin Ave., Milwaukee 8, Wis. The catalog illustrates four models of the Skid-Shovel with bucket capacities ranging from ⅞ to 3 yards.

The text stresses balance, visibility, and operator comfort. No piping, cross-bracing, or structural parts projejct above the original profile of the tractor. All heavy mounting-brackets and the hydraulic oil-tank and valves are set well to the rear of the tractor to add to the stability.

The bucket itself rides on shoes decreasing the strain on the tractor. The shoes also act as a lever to facilitate the prying action in loading. Other features described include a patented shock absorber, bucket levers designed for maximum tip-back at ground level, a magnetized oil-gage dip-stick which collects minute metal particles, and a bucket-depth indicator.

The booklet also illustrates a variety of attachments, including a bull-dozer blade, a grubber blade, and a rock fork.

To obtain this literature write to the company and request Bulletin K-653, or use the Request Card at page 18. Circle No. 115.

HRB Bulletins Discuss Soils and Concrete

Soil stabilization with the use of accepted and new materials is discussed in two reports contained in Bulletin 69 issued by the Highway Research Board of the National Academy of Sciences, National Research Council.

A paper by J. A. Leadabrand and L. T. Norling summarizes long-term studies made by the Portland Cement Association, correlating soil-cement test data for use in determining cement factors for sandy soils. The second paper, by L. J. Minnick and W. F. Meyers, evaluates the quality of lime-flyash-soil stabilization of projects now in service. Sonic test data with moisture content, density, and compressive strength of lime-flyash-soil mixtures is correlated in the paper.

An evaluation of the effectiveness of six admixtures in controlling soil erosion is given in another paper by L. J. Goodman. The booklet, which sells for 90 cents, can be obtained through the Highway Research Board 2101 Constitution Ave., Washington 25, D. C.

Light trucks equipped with one-way plows throw snow far off the road. Snow is spread thin so that banks are not formed.

Snow removal program has bare roads as goal

WITH MICHIGAN'S ANNUAL SNOWFALL ranging from a minimum of 10 inches in the southern part of the state to as much as 20 feet in the upper peninsula, the removal of snow and ice from the state's highways is necessarily a carefully planned operation. The three distinct climatic zones in the state require the use of widely different methods of combating winter conditions.

Maintaining a continuous flow of traffic in this state during the winter months is important, particularly since an extremely large proportion of it is motor freight which supplies the automobile manufacturing industry. These supplies of steel, fabricated parts, and other materials needed to feed the huge assembly lines are delivered to plants on an almost daily basis by a huge fleet of motor carriers.

In the words of B. R. Downey, maintenance engineer of the Michigan State Highway Department, "Highways in the southern part of our state are actually a part of the automobile assembly lines." With this in mind, his department, cooperating with many counties, carries out an effective winter program aimed at keeping all trunk highways open at all times and maintaining bare pavement conditions as much as possible.

Varied equipment, chlorides, and efficient communications system help to keep Michigan highways free of ice and snow

Above, a bank slicer brings snow onto the road while a rotary follows, throwing it into the fields. Below, a deep bank is widened and flattened by a heavy truck equipped with a V-plow.

Manual Details Procedures

The backbone of the program is the department's manual of procedures for combating ice and snow problems. This publication, circulated to supervisory personnel in cities, counties, and highway department districts throughout the state, contains comprehensive details on the steps to be taken to make the bare-pavement goal a reality.

Snow fence, containers for abrasives, pre-season preparations, reports and publicity, scheduling of crews, equipment preparation and operation, ice-control procedures, and other items are contained in the manual.

The manual is particularly effective for the Michigan system in which 68 of the 83 counties do maintenance work for the State Highway Department under contract arrangements. County maintenance supervisors follow the same guide and procedures, making the program uniformly effective throughout the entire state.

Equipment Matches Conditions

No snow removal program, however, can be effective without adequate and well-maintained equipment. Like most governmental agencies, the highway department buys its equipment on competetive bids, and as a result, numerous makes of equipment are used. In general, the equipment consists of trucks with underbody blades, trucks with one-way speed plows, heavy trucks with V-plows and wings, and rotary snow blowers. Spinner-type spreaders on bin-type trucks spread chlorides and abrasives.

Each county or maintenance district is suppplied with equipment it is most likely to need. Larger pieces of equipment, such as motor graders, large truck plows, and rotaries, are kept at strategic locations throughout the state and dispatched wher-

(*Continued on next page*)

Snow Removal Program Has Bare Roads as Goal

(Continued from preceding page)

ever they are required when conditions become too severe for lighter equipment.

Preventive maintenance and frequent careful inspections eliminate many possible breakdowns during operations. All machines are carefully inspected in advance of storms to see that snowplow frames are properly attached, hoists are in working order, chains are on wheels or else tagged and racked for quick mounting, and safety devices such as blinkers, flares, flags, and tow chains are in place.

Following the procedure outlined in the manual, the crews in each maintenance area erect snow fences, put up snow guides at hazardous locations, fill and place containers of ice-control abrasives, and prepare their equipment well in advance of the first storm. Then they stand by, working minimum hours at whatever maintenance projects are available until the storm strikes.

Snow Removal Procedures

When weather reports indicate that a snow storm is likely to strike, a man is placed on night patrol in a pickup to watch the conditions and call out crews when necessary. As soon as any snow begins to cover pavements, he alerts the crews and the battle is on.

Trucks with under-body blades strike the first blow, scraping off the traveled roadways before the snow is compacted by traffic. These units continue plowing as long as their operation is effective or until the snow becomes too deep.

When it becomes obvious that the underbody blades cannot win the battle alone, light trucks with one-way plows take to the road. These fast units are capable of throwing the snow far off the roadway and spreading it thin enough so that banks, which will gather more snow, are not formed. They are especially effective on modern streamlined roadway sections where snow can be pushed far off the roadway onto flat slopes or into wide ditches.

Unless the storm is very severe, these units handle the complete operation, continuing to plow until the roadway and standard shoulders are completely clear. If any snow has become compacted on the roadway and cannot be removed by the plows, chlorides are applied and the ice is bladed off as soon as it becomes loose from the road surface.

While the procedures described here are not the spectacular operations commonly pictured, they are the standard and very effective means of maintaining bare pavement conditions on a large part of the Michigan trunk highway system. The large fleet of fast, light units can usually get the snow off the main roads before it has an opportunity to settle or become compacted by traffic.

Heavy Equipment Fights Drifts

Although the spectacular operations are unusual, the big plows and rotaries do play an important part. Heavy equipment is particularly important in the upper part of the peninsula where as much as 20 feet of snow has fallen in one winter and where the average fall is about 130 inches per season.

Even in this area, the same initial steps are taken to combat a storm. When it appears that the light speed plows will be unable to meet the challenge, heavier trucks and V-plows are brought into operation. Rotary plows may be used to open badly drifted sections, and they are especially useful in cleanup since they can throw snow long distances.

When a storm has abated, bank slicers are used to bring drifts in from the edges of the shoulders so that speed plows or rotary plows can throw the snow far off the road. This eliminates banks on the outer shoulder that cause drifting snow to accumulate on the roadway in later storms.

Ice Control

While there is less snowfall in the southern, industrial part of the state, ice conditions are likely to be even more severe. This is the area where heavy trucking makes it most important that bare pavement conditions be maintained. In this operation, the use of chlorides plays an important role. With its salt and calcium chloride industries, Michigan has pioneered in the use of these materials for ice control.

During a sleet storm or when other icing conditions prevail, the first step is to maintain skid control by reducing slippery conditions. Complete removal of all ice from the pavements follows as soon as is practicable. Immediate application of calcium-chloride-treated abrasives at the rate of 2 to 3 cubic yards per mile or of pure salt or calcium chloride at the rate of 500 to 700 pounds per mile is made during any icing conditions.

This operation is continued as long as icing conditions exist. As soon as the storm has abated or the chemicals have made the ice loose, motor-graders and trucks with underbody blades scrape off the accumulation of ice and abrasive.

In recent years, Michigan has found the bin-type spreader particularly effective. Several manufacturers produce these spreaders which have a conveyor in the bottom of the bin-shaped body. The conveyor feeds the material to a spinner-type spreader at the back. Both conveyor and spinner are operated from the power takeoff of the truck. The spinner applies a uniform spread of treated abrasives over the roadway. Straight chemicals are sometimes applied, with-

out the use of the spinner, simply by spilling them off the conveyor onto the road where they are spread by traffic.

On accumulations of thick ice or snow, a serrated blade is used to score the surface of the ice. This concentrates the abrasives or chemicals on the road and also assists in skid control. No attempt is made to remove the ice with the serrated blades since this has been found impractical. When the chemical has loosened it, the ice is removed by conventional curved blades.

Procedures for removal of snow and ice from concrete or bituminous pavements and from gravel surfaces are practically identical. Straight salt or calcium chloride are not used on concrete pavements less than five years old unless the pavements have been constructed with air-entraining concrete, in which case the pure chemicals are applied after the first year.

A rotary plow cuts through a heavy drift on a blocked road. In addition to opening drifted sections, the rotaries, which throw snow long distances, are used in cleanup operations by the Michigan State Highway Department.

Mackinac Straits Crossing

The Michigan State Highway Department has an unusual winter maintenance problem in the operation o fthe Michigan State ferries across the Straits of Mackinac connecting the highway systems of the two peninsulas. Winter service on the ferry system was inaugurated in 1927. From that year until 1951, an icebreaker car ferry, the Sainte Marie, was leased for winter operations. In 1951, the new ice-breaking car ferry, Vacationland, was delivered to the department and put into operation. This 360-foot ultra-modern ship now maintains service on a two-hour round-trip schedule throughout the winter season—from mid-January to mid-April.

The Vacationland accommodates eight lanes of automobiles on the car deck which also has accommodations for passengers and crew. Eight-cylinder Nordberg diesel engines drive twin screws at each end of the craft, each developing 2,325 horsepower. Hull plating below the waterline is 1⅛-inch steel, with extra-heavy and closely spaced stanchions to resist the ice-breaking load. The vessel was built by the Great Lakes Engineering Works, Inc., River Rouge, Mich.

Winds, plus Lake Michigan and Lake Huron currents, sometimes bring tremendous quantities of ice into the straits, where huge pressure ridges are piled up. Last winter, one of these ridges was measured by the Coast Guard and found to be 30 feet thick. Maintaining a highway by boat under such conditions as these is certainly a unique operation for a highway department.

Publicity Is Important

In all its winter operations, the Michigan State Highway Department recognizes the importance of accurate and timely news reports for the public. Complete reports on road conditions, especially when these conditions are other than good, are telephoned daily to the maintenance division office in Lansing. From these reports, an up-to-the-minute news release is prepared for press and radio.

A resume of the reports is also sent to all state police posts via state police radio, then relayed to all district and county offices and garages by telephone. Thus, motorists are able to get timely and accurate information on road conditions throughout the state from their local highway department or from state police stations.

By this same system, weather reports and storm warnings are relayed to all county and district snow removal headquarters, giving them warning of any impending storms.

The Michigan State Highway Department, of which Charles M. Ziegler is state highway commissioner and B. R. Downey is maintenance engineer, has established an outstanding winter maintenance program. The annual expenditure of three and a half to four million dollars for the program appears well justified by the bare-pavement condition of the state's many miles of heavily traveled highway.

A. O. Smith Transfers

Manufacture of its newly designed line of ac and dc welders has been transferred from Milwaukee to expanded quarters at Elkhorn, Wis., by the Welding Products Division of A. O. Smith Corp. New construction is under way to add another 16,000 square feet to the plant.

Other manufacturing facilities are at Lancaster, Pa.

Steam Cleaning Unit

■ A new high-capacity steam cleaner, capable of discharging 150 gallons of cleaning solution per hour, is announced by the Clayton Mfg. Co., Box 550, El Monte, Calif. The Model LH Clayton Kerrick steam cleaner offers a graduated range of cleaning pressures extending from 30 psi for such jobs as paint stripping, to 100 psi for cleaning heavily encrusted or grease-coated parts and surfaces. Its helically wound heating coil is rated at a minimum thermal efficiency of 75 per cent by the manufacturer. Full working pressure is reached in two minutes from a cold start, so that there is no need to keep the machine in operation on a standby basis.

A variety of models include oil-fired, gas-fired, electrically-driven, gasoline-engine driven, portable, stationary, and trailer units. Each can be optionally equipped with remote nozzle control.

Among features are a fuel pump designed for fast priming, and a new soap pump to prevent air lock in the soap line. The pressure-atomizing burner is inverted directing the products of combustion downward through the heating coil. The heating coil can be cleaned of soot without being dismantled. Thermostat controls cut off the fuel supply to the burner in the event of excessive pressure or temperatures due to water supply failure.

On oil-fired units, capacity of the fuel tank is 13.5 gallons. Twenty-five feet of special vapor cleaning hose and an insulated swivel-handle gun with round nozzle are provided as standard equipment on all models.

For further information write to the company or use the Request Card that is bound in at page 18. Circle No. 101.

Data on Clad-Steel Plates

■ Advance techniques for fabricating clad steels are outlined on a wall chart offered by the Lukens Steel Co., Coatesville, Pa. The chart gives all basic information for arc-welding and flame-cutting clad steel plates.

The company also offers information cards with conversion tables and theoretical weights for clad-steel plates. Other data included on the cards are on inch-equivalent-for-sheet-thickness table for AISI manufacturers' standard-gage steel sheet; U. S. standard-gage stainless, nickel, Inconel and Monel sheet; and for Browne & Sharpe-gage copper, brass, and aluminum sheet. The data also includes conversion factors to determine the weight of solid alloys and certain nonferrous plates.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 54.

One-Man Hole Digger

■ A one-man, portable, hole-digging and tunneling machine is available from the Multi-Matic Corp., P. O. Box 2143, Van Nuys, Calif. The Super Hole-A-Matic digs holes at any angle from 4 to 8 inches in diameter and up to 6 feet deep with a shaft extension. It tunnels up to 12 feet deep for pipe installations.

The steel blades of the tool work with a pulverizing grinding action and will not bend, break, or throw the operator when obstructions are met. According to the manufacturer, the tool chews up softer shale and rides above large rocks without damage.

The digger operates from a 1.25-kw ac or dc generator. It can be used on a 115-volt dc or ac power source.

For further information write to the company, or use the Request Card at page 18. Circle No. 23.

Photo-Copy Machines

■ A new machine makes ready-to-use positive copies of anything that has been photo-copied. The Constat portable dry processor, made by F. G. Ludwig, Inc., Deep River, Conn., was designed to be used primarily with the company's Contoura portable photo-copier.

In the copying procedure, a 10-second exposure is made with the Contoura and, after 10 seconds in the Constat processor, a permanent copy emerges dry enough to use. No dark room and no rinses are needed. There are no fumes and no long drying period.

The dry processor can be used with any photo-copier.

For further information write to the company, or use the Request Card at page 18. Circle No. 87.

Electric Tool Catalog

■ A new catalog on portable electric power tools has been announced by Thor Power Tool Co., 175 N. State St., Aurora, Ill.

The catalog gives descriptions and specifications on the company's drills, grinders, hammers, saws, screwdrivers, nut setters, impact wrenches, and other equipment. The illustrated booklet also covers automatic valve refacers, valve seat grinders, and body and fender air hammers.

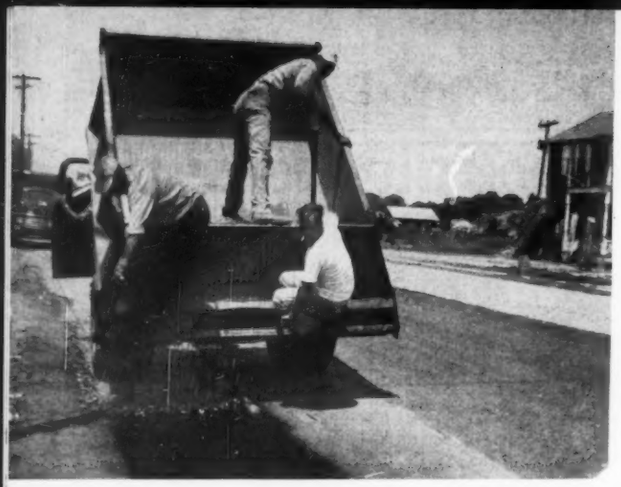
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 131.

Remote-Control Drive On Excavating Machine

■ A remote-control drive system for the Gradall, a multipurpose earth-moving and construction machine, has been announced by The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio. The new control, which is available as an optional accessory, provides one-man operation, and is said to give the operator increased control for maneuvering the machine on the job. The turn of a switch starts or stops the carrier motor, drives the Gradall forward or backward, steers it right or left, increases or decreases the carrier engine speed, and even blows the horn.

The pneumatic electric control system is operated by a panel mounted inside the cab. The control panel has an electric tachometer showing the rpm rate of the carrier motor and an audible alarm signal for air pressure loss.

For further information write to the company, or use the Request Card at page 18. Circle No. 65.



As the Ford truck backs up, a Gibbes stone spreader puts stone over the bitumen at a rate of 47 pounds per square yard.
C. & E. Photo

Traffic snarl easy

MARION, S. C., is now enjoying a definite relief from a traffic problem that had long plagued its downtown business district. Marion is a hub for several main highways, including U. S. 76, which runs about east-west and is intersected by U. S. 501 in the heart of the city. The latter highway carries heavy traffic to Myrtle Beach, the Palmetto State's largest oceanside resort.

To overcome this traffic bottleneck, the South Carolina State Highway Department built a bypass, 1.6 miles long, that shifts U. S. 76 well south of Marion's busy downtown area. U. S. 76 now meets U. S. 501 at a sparsely settled section of the city, thus eliminating tie-ups and snarls in Marion's crowded, narrow streets.

The project was divided into two parts. Part 1, on the west, left U. S. 76 on Liberty Street and continued 0.6 mile to an intersection with U. S. 501. Part 2 picked up at this point and continued 1.0 mile east on Euclid Street to rejoin U. S. 76 beyond the city's congested business district. Construction of this alternate route involved grading, drainage, widening, bituminous surfacing, asphaltic concrete paving, curb and gutter work, and sidewalks.

Hubbard Gets Job

The Highway Department awarded a contract for the work to the Hubbard Construction Co., of Marion, S. C. The estimated contract price for the entire project totaled $233,644. Hubbard sublet all the bituminous items in the contract to the Sloan Construction Co., Inc., of Greenville, S. C. Because of the varying street and road facilities existing where the new alignment was planned, no typical cross section was possible for the entire job. Thus, at the western end, use was made of the original pavement in place, since it was in good condition, and the new highway was built around it. This resulted in a saving not only in money, but also in time, since tearing out the old pavement and replacing it would have seriously delayed completion of the project.

The original pavement retained at the west end of the job was concrete—20 feet wide x 8 inches thick. Adjoining this pavement were dirt strips of varying width. These dirt strips were excavated and replaced with a sand-clay base course, 8 inches thick. Before this earth-type base was laid, however, the subgrade under it was compacted, for a 6-inch depth, to a minimum density of 90 per cent (AASHO specification T-99). The base course itself was compacted to 95 per cent.

Along the south side of the old concrete slab, the base course varied from 3 to 9 feet in width, while on the north side, it was wider—from 16½ to 21½ feet. The varying width of base course on each side of the old slab was necessary because the center line for the new alignment did not coincide with the center line for the existing concrete pavement. A uniform width of 43 feet was maintained, however, measured across the original paving and new flanking base course strips. Concrete

...city bypass

Bituminous surfacing and plant-mix-project clears business section of through traffic

curb and gutter, totaling 3 feet in width, was laid on each side, bordering the base course. Of this width, 6 inches comprises the curb, with the remaining 2½ feet making up the gutter.

Sand-Clay Base

This gives the western part of the new road a total width of 48 feet between curbs; center crown is 7 inches. The sand-clay base was given a bituminous prime and surface treatment. Then asphaltic concrete was laid over the entire roadway to cover the old cement-concrete pavement. In back of the curb is a 3½-foot berm or shoulder, then a 4-foot concrete sidewalk with a uniform thickness of 4 inches.

At the eastern part of the job, where no paving existed on the 66-foot right of way, an 8-inch uniform sand-clay base course was laid to a width of 39 feet. This was flanked by concrete curb and gutter, offering a clear roadway width of 44 feet for two 12-foot driving lanes and two 10-foot service lanes next to the curbs. Center crown is 6 inches. The base course was first topped with a bituminous surface treatment, then covered with asphaltic concrete.

Prime contractor Hubbard did the bulk of the grading with three tractor-scraper units, with two motor graders handling the shaping and fine grading. Storm drainage work involved the laying of 1,444 linear feet of 36-inch, and 2,116 linear feet of 24-inch reinforced-concrete pipe.

Inverted Penetration

Good material for the sand-clay base course was obtained from a pit only one mile from the job. This earth mixture averaged from 13 to 15 per cent clay, 6 per cent silt, and the rest was sand. A dragline loaded out to a fleet of 12 trucks, which hauled the pit material to the road. The material was put down in one layer, thoroughly mixed with disks, harrows, and the grader blades, then compacted with rubber-tire rollers.

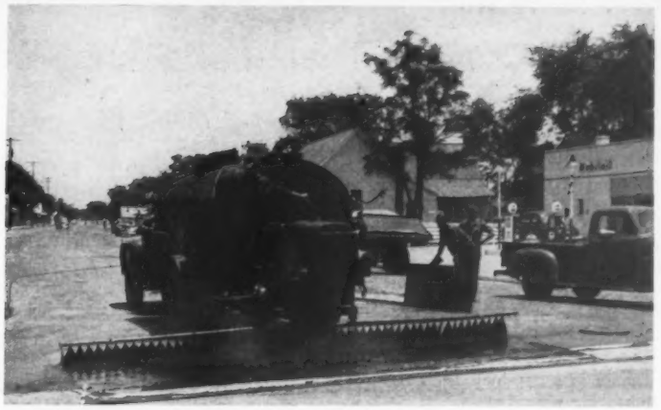
Over the base went a prime of RT-2 tar at the rate of 0.3-gallon per square yard. The tar was supplied by Southeastern Bituminous Co., Inc., and was delivered to the project by tank truck from Augusta, Ga.

The bituminous surfacing that followed the priming consisted of an inverted penetration without seal and averaged ½ inch thick. First, a shot of liquid asphalt, penetration 150-200, was applied at a rate of 0.4-gallon per square yard at a temperature of 340-360 degrees F. Asphalt from the Standard Oil Co. in Charleston, S. C., was shipped in tank cars to the Atlantic Coast Line's railroad siding in Marion. There, a Cleaver-Brooks tank car heater unit transferred the bitumen to an Etnyre 1,570-gallon distributor mounted on a Ford F8 truck.

Putting It Down

The distributor was equipped with spraybars from 10 to 24 feet wide to accommodate strips of variable width. Nozzles had ⅛-inch open-

(Continued on next page)



An Etnyre 1,570-gallon distributor, with a 19-foot spraybar, starts a run at the U. S. 76 and U. S. 501 intersection. *C. & E. Photo*

Traffic Snarl Eased By City Bypass

(*Continued from preceding page*)

ings and were spaced 4 inches on center. A guide bar, extending from the right side of the front bumper, barely touched the curb and kept the operator on line. All runs started and stopped on 3-foot-wide strips of building paper, laid across the road to prevent any excess of bitumen at the construction joints. Hand spraying from the distributor was used at intersections.

Crushed granite stone to cover the bitumen was obtained from Ryan's Quarry at Winnsboro, S. C. This material also was shipped by rail to the siding, where an Insley ½-yard crane unloaded it to a fleet of Ford F6 trucks. The trucks were equipped with Daybrook steel dump bodies with hydraulic hoists and Gibbes stone spreaders. As the trucks backed over the mat covering the bitumen, stone was spread at the rate of 47 pounds per square yard. Steel-wheel rolling followed.

A Cleaver-Brooks tank-car heater unit transfers asphalt from a tank car to an Etnyre distributor on the Marion, S. C., bypass project. The bituminous work was subcontracted to the Sloan Construction Co., Inc. *C. & E. Photo*

Gradation of the No. 3 stone used in this single treatment penetration follows:

Sieve Size	Per Cent Passing
1½-inch	100
1 -inch	85–100
¾-inch	25–55
½-inch	0–10
No. 4	0–2

Plant Mix

Before any plant mix was laid, the existing concrete pavement and the new stone mat were given a tack coat of liquid asphalt, applied at the rate of 0.08 to 0.1 gallon per square yard. In preparation for the tack coat, the pavement was swept with a Grace power broom.

At the time the job was done, the Sloan Construction Co., Inc., which sublet the bituminous work, had a Barber-Greene continuous-mix plant set up on the Atlantic Coast Line Railroad siding along U. S. 76 and nine miles west of Marion. Since the haul distance was reasonable, and since Sloan was doing other work in that area and did not want to shift location, all hot mix was furnished by this plant.

Standard Oil Co. supplied 85-100 penetration asphalt for the mix from Charleston, S. C., and delivered the material by tank truck. Bitumen storage facilities at the plant totaled 20 000 gallons. For the aggregate, Campbell Limestone Co. of Beverly, S. C., furnished stone screenings, and the Becker County Sand & Gravel Co. supplied gravel.

A Lorain ¾-yard crane loaded the aggregate into the receiving hopper of the plant, which was powered by three Caterpillar diesel-electric generators—two D4600 and a 13000 unit.

The Mix

Specifications for the mix were:

Sieve Size	Per Cent Passing Min.	Max.
¾-inch	100	
½-inch	87	100
⅜-inch	75	94
No. 4	58	72
No. 10	42	58
No. 40	21	32
No. 80	15	23
No. 200	4	10
Hydrated lime	0	1
Bitumen content	6.5	8.5

The job formula established conformed to the following:

Sieve Size	Per Cent Passing
¾-inch	100
½-inch	100
⅜-inch	90
No. 4	68
No. 10	52
No. 40	28
No. 80	19
No. 200	6
Filler, minimum	4
Bitumen content	7

A fleet of 14 hired trucks, aver-

aging 8 to 9 tons a load, hauled the hot mix from the plant to the job. The mix was laid in a single course in 10 to 11-foot lanes by a Barber-Greene finisher, then compacted with steel-wheel tandem rollers—Buffalo-Springfield and Galion. Finished thickness of the asphaltic concrete is 1¼ inches.

Sloan Construction Co., Inc., employed a Motorola 2-way radio to keep in touch with the different jobs that were being supplied with asphalt from this plant. The 60-foot-high antenna at the plant gave the system a range up to 50 miles and covered all active projects in the area. Sets were installed in the cars of superintendents, mechanics, and road foremen.

Quantities and Personnel

Major items in the highway bypass contract included:

Excavation	19,763 cu. yds.
Earth type base course	9,956 cu. yds.
Bituminous surfacing	35,701 sq. yds.
Asphaltic concrete	4,250 tons
RC pipe, 15 to 48-inch	9,220 lin. ft.
3-foot conc. curb and gutter	15,233 lin. ft.
Catch basins	50 ea.
Drop inlets	10 ea.
Manholes, new	25 ea.
Manholes, to be adjusted	10 ea.

Hubbard Construction Co. employed an average force of 35 on its contract, which was under the supervision of Grady Hubbard, superintendent on the grading, and Harry Snyder, superintendent on the base work. Sloan Construction Co. used about 22 men on its part of the job. L. G. Gillem was general superintendent, with superintendents I. P. Whiteford on the surface treatment, Frank Miller at the plant, and Paul Brock on the asphalt laying.

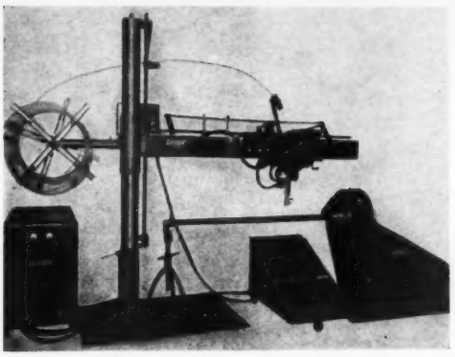
For the South Carolina State Highway Department, H. J. Jaeger was project engineer. The Department is headed by C. R. McMillan, chief highway commissioner. S. N. Pearman is state highway engineer, and J. D. McMahan, Jr., is construction engineer.

Lift Truck Instructions

■ Tips on the operation of a lift truck are given in a booklet from the Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg. The booklet, "How to Operate a Lift Truck", uses the cartoon technique for easy reading. It covers operation, recommended preventive maintenance, safety procedures, and materials handling. Drawings for setting up an obstacle course are also included.

The booklet has been prepared for use as part of an operator-training program, and is written for the beginner and experienced operator.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 122.



The Leader Model 650 welding machine.

New Welding Machine

■ A new automatic welding machine is announced by Leader Welding & Mfg. Co., 2418 Sixth St., Berkeley 2, Calif. The Model 650 welder features a consolidated finger-tip control panel. It has dual, adjustable, spring braked, rod-reel holders and a motorized acme-powered 8-foot cross arm with side beam carriage.

A motorized pedestal has a 6-foot push-button-controlled lift and can be rotated 360 degrees. The automatic welding head comes complete with assorted contact tips, tip extensions, and adjustable rod feed rollers.

All incidental wiring is harnessed to allow three-phase, 220/440-volt, 150/75-amp connection at the point of installation.

For further information write to the company, or use the Request Card at page 18. Circle No. 22.

Davey Appoints Manager

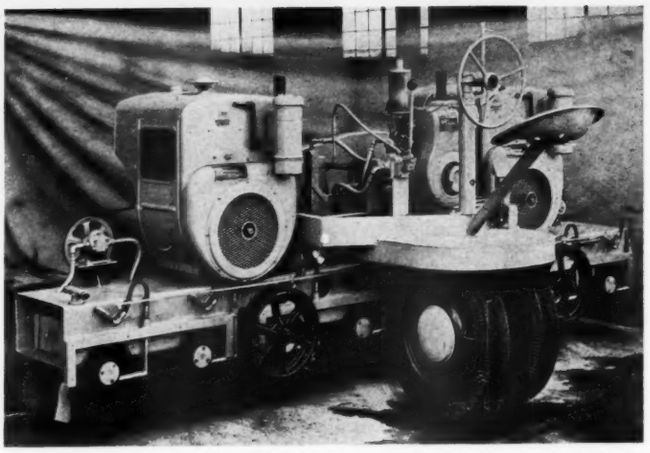
Paul H. Nast has been appointed manager of the rock drill division, Davey Compressor Co., Kent, Ohio.

In his new post, Mr. Nast will be in charge of sales, engineering, and manufacture of the complete Davey air tool line of pavement breakers, rock drills, tampers, and other equipment for the construction industry.

Multiple-Blade Saw Cuts Concrete Joints

■ A multiple-blade sawing machine, designed by Hurst Lewis, for cutting weakened plane joints in concrete is available on a rental basis from Joint Sawing, Inc., 265 N. Vinedo Ave., Pasadena, Calif. The unit, which is mounted on a pneumatic-tired tricycle-type rig, has eight saw blades in tandem on a 12-foot model and sixteen blades on a 25-foot machine. It cuts a 3/16-inch joint 2 inches deep in about 1½ minutes. Each blade moves about 18 inches transversely as the machine cuts a 12-foot or 25-foot panel.

Power comes from two 31-hp engines on the 12-foot unit and four 31-hp engines on the 25-foot machine. The sawing blades or disks first cut straight down to the specified depth and then complete the joint by sawing transversely The sawing boom is raised or lowered hydraulically. An adjustable traction-load clutch regulates sawing speed. The water-cooled blades can be set at an angle for diagonal cuts.



The multiple-blade saw produced by Joint Sawing, Inc.

For further information write to the company, or use the Request Card at page 18. Circle No. 140.

New Line of Scrapers

■ A new line of open-top, tractor-drawn, rubber-tired scrapers, ranging in capacity from 10.5 to 28.5 cubic yards is announced by LeTourneau-Westinghouse Co., 2301 N. Adams. St., Peoria, Ill. The scrapers are available in four sizes.

The O-14 Carryall scraper, designed for use with tractors of 70 or more horsepower, has a struck capacity of 8.1 cubic yards and a heaped capacity of 10.5 cubic yards. The O-19 model, for tractors of 75 or more horsepower, carries 12.2 yards struck and 16 yards heaped. The third size of the open-top line, the O-23 for tractors of 80 or more horsepower, has a capacity of 14.4 yards struck, and a heaped capacity of 19 yards. The largest unit, the O-35, has a load rating of 22.5 yards struck and 28.5 yards heaped and is designed for tractors of 100 or more horsepower.

The new scrapers are operated by a double-drum power-control unit whose two cables work through self-aligning swinging sheaves, mounted on the front of the scraper yoke. The manufacturer points out that the elimination of overhead cables facilitates shovel or conveyor loading. Another feature is that the construction of the gooseneck allows clearance for various tire combinations.

The scrapers have a hard-surfaced, reversible blade. Replaceable side-runners reduce windrowing by guiding the material into the bowl.

For further information write to the company, or use the Request Card at page 18. Circle No. 97.

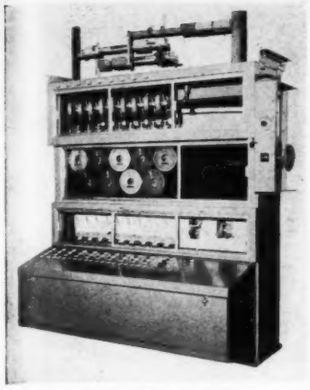
Small Power Roller

■ A utility power roller that is useful for back and forth rolling of streets, driveways, and sidewalks, and for patching jobs on highways is illustrated in literature from Consolidated Industries, Inc., Mixville Road, West Cheshire, Conn. The Con-Sol roller has a main roller 24 inches in diameter and 24 inches wide and a sulky roller 18 inches in diameter and 24 inches wide. Over-all length is 80 inches. It is powered by a 2½-hp Briggs & Stratton gas engine.

Weight of the complete roller in the standard model varies between 300 and 1,200 pounds, depending on the amount of water in the rollers. In the all-purpose model, the weight varies between 375 and 1,400 pounds. The latter model has a 1215-gallon sprinkler tank with a valve adjustment that permits water to flow on the front and rear rollers to prevent asphalt from sticking.

The power roller has both forward and reverse speeds, and the shifting is controlled by foot levers so that the hands are free to steer and operate the throttle.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 76.



The new Johnson 120 Mix Selector.

New Control Panel For Concrete Batching

■ A push-button control panel which enables the operator to produce 120 different size and type batches of aggregate and cement is announced by the C. S. Johnson Co., R. F. D. No. 1, Champaign, Ill.

A repeater mechanism provides for uninterrupted automatic rebatching of any one selection a predetermined number of times. The mix-selection mechanism is electrically controlled and is installed under the multiple-compartment aggregate and cement bin.

The Model 120 Mix Selector has a mix-number indicating-wheel and a hand wheel located on the right-hand side of the control cabinet. These added control devices make the various mix selections possible. Accurate weighing is accomplished through the use of micro-switches as cut-off devices. They are incorporated in each individual scale unit.

The hand wheel has a positive lock which prevents accidental change of the selection during batching. The wheel assembly is designed to enable the operator to shift rapidly from one mix to another.

Basic features of the older 24-selection model are included in the new unit. Automatic single-material batchers on each compartment are controlled by the central dial-scale unit, with pens recording the weight of each single material batch.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 116.

Centrifugal Pump Line

■ A line of portable centrifugal pumps is shown in literature from the Rice Pump & Machine Co., 220 N. Milwaukee St., Grafton, Wis. The line of self-priming pumps includes 2-inch models of 7,000 to 10,000 gph capacity, 3-inch models of 1,500 to 20,000 gph capacity, and 4-inch units that can handle up to 40,000 gph. Power units for the pumps are 4-cycle, air-cooled engines.

All pumps are available with two steel or rubber-tired wheel or steel skids. Wheelbarrow mountings may be had for some of the smaller models. The pumps may also be obtained with electric motors or with belt pulleys.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 129.

Line of Snow Plows

■ A bulletin on snow plows for motor trucks is available from the Baker Mfg. Co., 2573 S. 10th St. at Stanford, Springfield, Ill. The booklet covers V-type snow plows and reversible and one-way sectional-tripping blades.

The V-type snow plows are available with moldboard heights from 30 to 48 inches at the front and 58 to 86 inches at the rear. Moldboard width at the cutting edge ranges from 7 feet 6 inches to 9 feet.

The reversible sectional-tripping blades are said to permit higher truck speeds with the blade placed right down to the pavement. Only the section of the blade striking the obstruction trips, and very little snow drifts back as a result.

The one-way sectional-tripping blades offered are furnished with either caster wheels or flat runners. These plows have a provision for offsetting the moldboard to the right.

The literature also illustrates the company's lift and push frames that mount on any standard truck for use with the snow plows.

To obtain Bulletin No. 1003 write to the company, or use the Request Card at page 18. Circle No. 125.

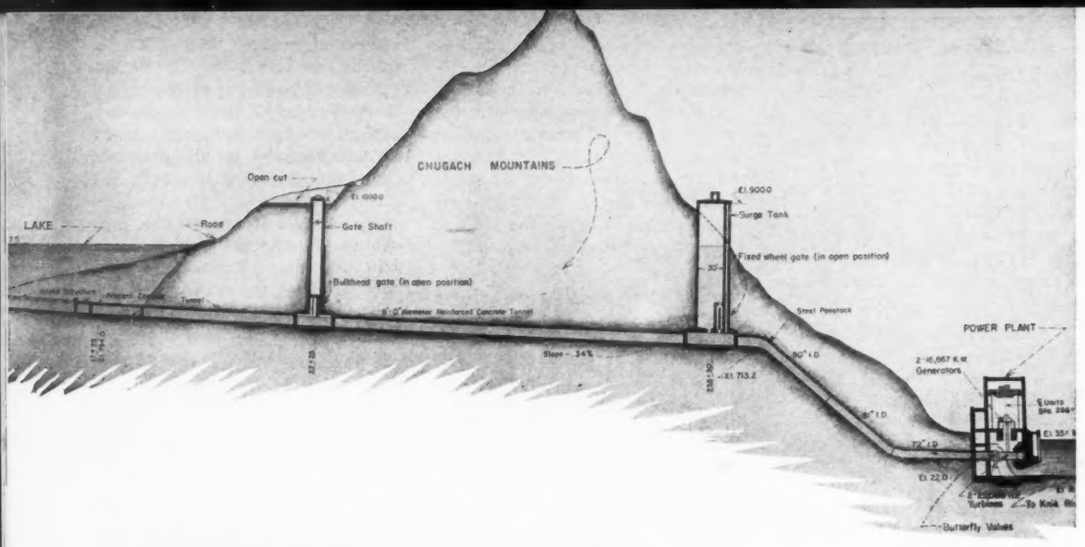
New Plant and Promotions For Caterpillar Tractor

The selection of a site for a new manufacturing plant and the creation of a new Engine Division have been made by Caterpillar Tractor Co., Peoria, Ill. The company's line of motor graders and industrial wheel tractors will be made at the new $45,000,000 plant in Decatur, Ill.

Warren Kinsey is manager of the new plant; A. W. Johnson, manager of manufacturing; Ridley Orton, purchasing agent; H. O. Nelson, manager of employee relations; and C. A. Vobroucek, chief accountant.

H. H. Howard, formerly director of domestic sales for the company, is the manager of Caterpillar's Engine Division. W. K. Cox has been made manager of the new sales promotion department, which combines the Sales Training Division, the Sales Development Division, and the advertising department. W. S. Zeigler will take the post of director of domestic sales, replacing Mr. Howard.

Three men have been appointed to positions at the company's plant now being constructed in York, Pa. They are W. E. Doersam, manager of the parts department; M. D. O'Byrne, manager of the parts office division; and R. W. Cooper, manager of the stores division.



A profile of the Eklutna Tunnel, which will carry water under the Chugach Mountains from Eklutna Lake to a new powerhouse.

HYDROELECTRIC POWER for Alaskan Cities

By RAY DAY

Drillers man an Ingersoll-Rand drill at the north heading of the tunnel. Excavation was planned so that headings can be worked from each end of the project.

UNDER THE GRAY, snow-capped spires of the Chugach Mountain range near Palmer, Alaska, a U. S. Bureau of Reclamation project is under way in spite of wild working conditions in the area. It is no exaggeration to say the job is "wild". Operations closed down for three hours one day until the superintendent could shoot a bear which lay growling behind tunnel supports. The worst accident on the project was caused not by heavy machinery or caving ground, but by a charging bull moose. And the temperature has been as low as 50 degrees below zero.

These are some of the reasons why the Eklutna hydroelectric project has a general reputation in the U. S. of being the USBR's last frontier. Eklutna is the bureau's first major Alaskan undertaking. Built under contract by a joint-venture firm of U. S. contractors called Palmer Constructors, the $33,000,000 project is located 30 miles from Anchorage, Alaska's largest city. When completed, it will furnish hydroelectric power to the important cities of Palmer and Anchorage and will tie Eklutna Lake to Knik River.

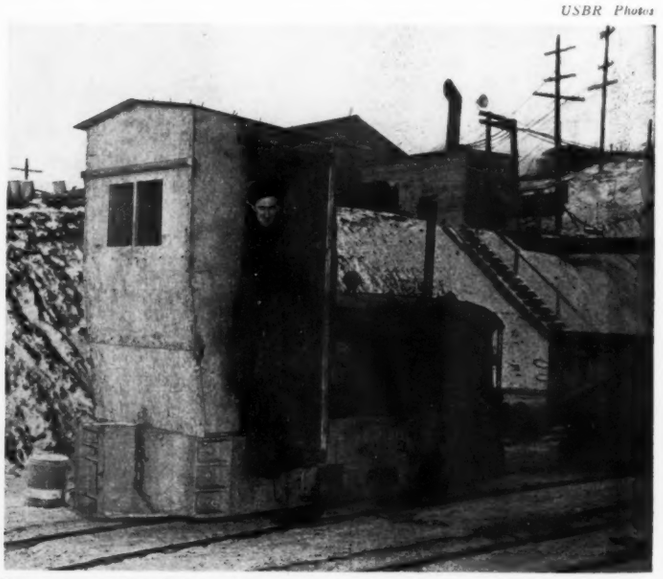
Interesting Design

Need for the Eklutna project came with the mushrooming growth of Anchorage and Palmer and the subsequent scarcity of electric power. Electric power is a commodity rare enough in this region so that anybody with kilowatts to spare can sell them for 11 cents per kilowatt hour, no questions asked.

The preliminary study of the Eklutna situation showed the feasibility of drilling a tunnel from glacier-fed Eklutna Lake to Knik River. It goes under the Chugach Mountain range, drops the water through a powerhouse, and discharges spent water to Knik River at the lower end of the system. A small hydroelectric plant previously built at the lower end of Eklutna Lake by private enterprise generates some power, but not enough to meet urgent needs. The larger

Huge vent lines are needed in the 5½-mile-long tunnel. Ventilation is secured through the use of Roots-Gonnersville blowers and an Ingersoll-Rand booster fan.

USBR Photos



Temperatures on the Eklutna project sometimes reach 50 degrees below zero. The operator of this Plymouth locomotive works in a weather-proof cab.

Aided by a Caterpillar tractor, a Kenworth truck hauls a 43-ton section of pipe up the mountain grade leading to the Eklutna end of the tunnel.

A Lorain Moto-Crane is rolled aboard a floating pontoon barge. The rig jets powder holes for blasting in advance of dredging operations.

Eklutna project includes tunnel boring, dredging, penstock, and powerhouse construction

Eklutna project will tap Eklutna Lake for 30,000 kilowatts of installed generating capacity.

The USBR set the project up and obtained Congressional authorization for it on the basis of repaying the entire construction cost over a 50-year period, with three per cent interest, from the sale of electric power. Power will be sold to two cooperatives and the City of Anchorage, all in the Anchorage-Palmer vicinity.

Basically, the project consists of an underwater intake in Eklutna Lake, 23,000 feet of 9-foot ID circular tunnel under the mountain range, a 9 to 6-foot reduced power penstock which drops about 700 feet, and a reinforced-concrete powerhouse in which two 15,000-kw generators are to be installed. The system also includes a pair of surge tanks and gate shafts built in the tunnel.

The $17,340,000 tunnel contract is held by the joint-venture firm previously mentioned, consisting of Morrison-Knudsen Co., Inc., of Boise, Idaho; Peter Kiewit Sons' Co., of Omaha, Nebr.; and Coker Construction Co., Alaska contractors.

The intake structure was subbed from Palmer Constructors by Ben Gerwick, Inc., of San Francisco. Contract for the power plant was let directly under a USBR bid to Rue Contracting Co. of Fargo, N. D., for the sum of $2,579,000. Power from the job will be marketed by the USBR over a system of transmission lines which also were built under contract. The first of these, from Eklutna to Palmer—a distance of 15 miles—was built by Morrison-Knudsen Co., Inc., and Wiggins Electric Co. for the contract price of $395,000. This line is a 115,000-volt installation. Another transmission line from Eklutna to Anchorage is also a 115-kv affair, which covers a ground distance of 30 miles. Built also by Wiggins Electric Co., its construction price was $444,000.

The Eklutna Tunnel pierces an area of sedimentary and metamorphosed rock that is badly faulted, folded, and twisted. Faults are so numerous, in fact, that project geologists have practically stopped counting them.

The rock formation consists of graywacke and argillite, with a few deposits of greenstone higher in the tunnel. At one time, the country was all covered by glaciers, and evidence of several glacial advances is still visible. There are 400 feet of glacial till in many parts of the vicinity. All water in the glacier-fed streams nearby is milky-gray from the presence of glacial flour, carried in permanent suspension.

Behind some of the fault zones are geological barriers with trapped water pockets, which produced heavy ground water trouble in the tunnel. It was through this geological hodgepodge that the tunnel's path lay.

The location and design of the system imposed other problems. For example, the inclined penstock goes into the mountain, then rises on an abrupt 53 per cent grade. The installation of steel penstock liners in this incline is bound to be a considerable problem. There was also a great deal of concern about what would happen to turbine blades when the dirty glacier-fed water poured through the hydroelectric generating system. Studies have been made by USBR experts, however, which show that the material in suspension is so fine and light that no damage over that of clear water can be expected.

Tunnel Excavation Begins

Tunnel excavation has been something which many miners will long remember. Ground water, tricky digging, and other factors, all equally bad, entered into the job. It was a tunnel where anything could happen and frequently did. The entire tunnel was tied up, for example, when a two-year-old black bear walked into an adit, found its way into the tunnel proper, crawled behind some lagging, and growled a fierce challenge to anyone who came close. For about two hours, miners tried to scare the bear away. At

(Continued on next page)

A hydraulic dredge digs into a glacial spoil bank for backfill material that will be placed over the intake pipeline connecting intake and tunnel proper.

Samples of the lake bed are taken by geologists, here shown boring through the ice on Eklutna Lake with a Barco gas-driven machine.

Hydroelectric Power For Alaskan Cities

(Continued from preceding page)

this point, one of the superintendents went to the camp for his rifle and returned to shoot the bear.

Tunnel excavation was set up so a heading could be worked from each end of the project. At the Lake Eklutna end, a gate shaft was sunk vertically. The tunnel picked up from this opening, and carried on to a predetermined station in glacial till under the lake bottom, beyond the end of solid rock. The heading was then started the other way toward the holing-through point near the center of the job. Another heading was opened at the Knik, or north end, and driven toward the holing-through position near the center point. At this end, a short adit was excavated to the surface to provide ingress to the tunnel.

Similar excavation methods govern both headings. At the north face, for example, a 35 to 40-hole pattern is being used for the removal of an ordinary round, which usually pulls about 9 feet. A rail-mounted drilling jumbo, built small with a single deck to clear the small-diameter tunnel, is being used. Five Ingersoll-Rand DA-35 drifters, using 10-foot steel and Timken tungsten-carbide bits, are being used for the drilling job. Part of the machines are mounted on aluminum shells with 4 feet of travel, and part are mounted on hydraulic jibs.

Bottom and lifter holes are drilled from the tunnel floor position in front and under the main jumbo. A typical burn cut varies from a 3-hole pattern in argillite to a 5-hole pattern in graywacke. These holes are being loaded with Atlas 40 per cent powder, and the round laid out for No. 1 through eight delays, breaking from the center to the outside.

At the south face, a similar five-machine drilling setup is being used, pulling 8-foot rounds with 9-foot steel. Air compressor equipment consists of one 1,300-cfm Gardner-Denver stationary compressor and one 1,100-foot Gardner-Denver compressor. Ingersoll-Rand compressors, totaling 2,000 cfm, furnish air for the south heading. Ventilating air is furnished by 250-hp Roots-Connersville blowers, and in addition, an Ingersoll-Rand booster fan driven by a 125-hp motor is available at the north heading.

Mucking equipment includes three Conway 50-B's and one Eimco 21, which is used as a standby machine at the south heading. A total of 21 3-cubic-yard Western muck cars is available at each heading to remove blasted material. On the Eklutna Lake heading, 5-inch H-beam steel rib supports on 8-foot centers are necessary to prevent sloughing. In this section, the tunnel is being drilled in horseshoe shape. In more solid rock, where no bracing is required, the circular section is used. Plymouth diesel locomotives are being used to handle the trainloads of blasted materials, and cars are loaded with the aid of a small car passer. A passing track is placed every 3,000 to 4,000 feet so that traffic can be controlled safely.

The first mile of tunnel excavation on the north heading was one of the worst many of the miners can remember. The heading had advanced about 1,500 feet when ground water began to run in. At this point, only 5 to 25 gpm was running in. Then, as the heading advanced several hundred feet more, the flow picked up to such proportions that a weir was set up. Measurements showed the inflow to be 217 gpm, and it soon jumped to 300, then 500 gpm. Shortly after a fault zone had been pierced, 4,500 feet in, a menacing stream of water appeared and began to grow rapidly. Within about 36 hours, work was at a standstill because the entire heading and roof of the tunnel had caved in, and the water flow was up to 15,000 gpm. The flow was so great that water ran 3 feet deep at the tunnel entrance.

Operations were stopped for 60 days while this flow ran its course.

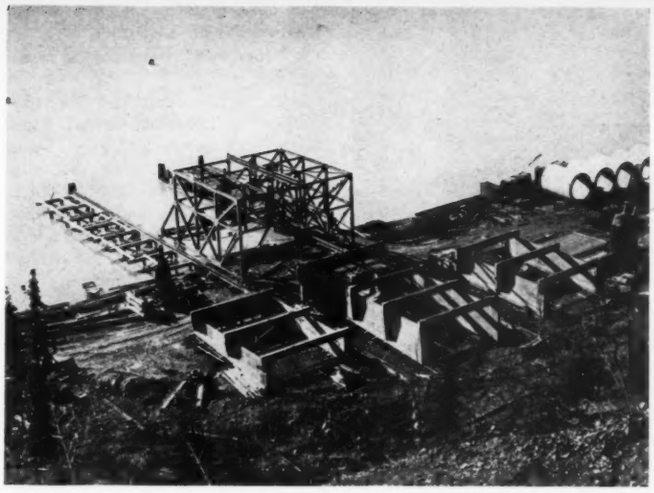
Engineers and workmen on the Eklutna project are housed in this Bureau of Reclamation construction camp near Palmer, Alaska. *USBR Photo*

As the water subsided, miners went back in with additional bracing. The bad spot was slowly passed, and strangely enough, as the tunnel was pushed farther back into the mountain, it became drier. At the high point, where there is 4,500 feet of overburden above the tunnel bore, the tunnel was virtually dry.

Now, miners are in better rock, and round time is below four hours. Two months ago, one of the headings accounted for 1,500 feet in a month. Combined footage for the two headings has been running 2,500 linear feet per month. Excavation is expected to be completed in the latter part of this month.

According to project supervisors, a good safety record was made. The most serious accident happened under circumstances peculiar to Alaska.

Coming to work one morning, an electrician found a huge bull moose tangled in electric wires and cables 60 feet above the adit road. Below the moose was a sheer 60-foot dropoff, terminating in a shallow highway berm, with another dropoff below that. Aware of his danger in releasing the moose, the electrician first rigged up a safety rope to give him a way out of there when the moose was free.



Sections of the intake structure are built on the shore of Eklutna Lake, then placed by gantry cranes. *USBR Photo*

Gingerly, he began to work with wire cutters. When the last wire was snipped, the moose broke free, and walling its eyes, swayed unsteadily for a moment. But as the electrician ran for his safety rope, the moose started to head him off. Lowering its huge head, it charged. In his excitement, the electrician lost hold of the rope. The huge beast brushed past him, and both plunged 60 feet to the road below, where surveyors were working. It was a year later, after a long stay in the hospital, before the electrician was able to get around again.

But there was still life in the moose. As the 2,000-pound animal rose unsteadily to his feet, one of the surveyors grabbed an axe from the truck and hit the moose between the eyes with it while the animal was still groggy. Down went the moose, only to get up once more. Each time the surveyor hit the moose, it went down, but quickly got up again. Finally, it stayed on the ground long enough; the men dragged it to the edge of the berm and shoved it over the 200-foot drop. Then, two men went down to finish the job. Other men had already called an ambulance for the electrician.

Two of the tunnel headings called for uphill drilling. One of the surge chambers, for example, called for a 7 x 9-foot pilot rise, with main excavation carried down through the hole. This surge chamber is about 35 feet in diameter. The penstock rise, which goes up at a 53-degree angle, was also drilled under the same adverse conditions.

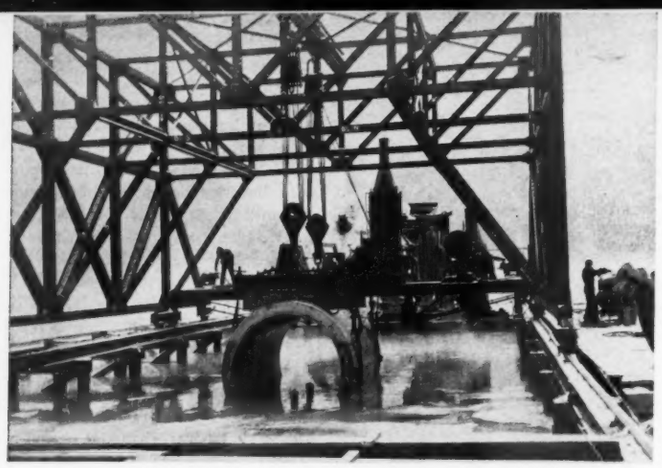
Conventional Tunnel Lining

Tunnel lining consists of reinforced-concrete, built to a minimum of 5½ inches in unsupported sections and 12 inches or more in supported sections. A recent estimate places 60 per cent of the tunnel footage in supported sections, with the remainder in good rock, where supports were not required and the tunnel could be drilled with circular cross section.

A study for concrete aggregates by USBR geologists disclosed a source of good material in Knik River, not far from the north portal. Palmer Constructor let a subcontract to Alaska Aggregates Corp., Anchorage, for the production of aggregates and sand. Alaska Aggregates brought in a small production setup consisting of a Cedarapids portable plant, which worked for several months turning out the material. Sand provided the only difficulty in recovering the river gravel deposit. It was necessary in several cases to haul in blending material to get the proper fineness modulus.

A Noble full automatic batching plant is set up close to the powerhouse for the proportioning and

(*Continued on next page*)



This type of rigging handled the 43-ton concrete pipe sections. Straps, left in place when the gantry drops the sections at the water's edge, are picked up by the derrick barge which carries the pipe to its final position. *USBR Photo*

Hydroelectric Power For Alaskan Cities

(Continued from preceding page)

mixing of concrete. The tramway division of Columbia-Geneva Steel Corp. also is designing a 2-gut tramway 1,400 feet long, that will carry mixed concrete from the batch plant to the north end tunnel entrance. William Schutte, Engineering Associates, and Chicago Bridge & Iron Co. are manufacturing 240 feet of traveling-steel tunnel forms in 8-foot lengths. They will be used for the lining pours. Plans are to make the pours in 240-foot increments. The form carrier already built will pick up and transfer 24 feet of forms at a time.

The concrete lining is expected to be placed by a Pumpcrete 200 single machine. In the top of the circular tunnel section, a shallow key was blasted to make room for the Pumpcrete slick line. In horseshoe sections, there will be enough room for it above the forms. Lining will proceed to the north portal from the Eklutna Lake end, where about 500 feet is already in place.

Underwater Intake

One of the most interesting job features is the construction of a reinforced-concrete underwater intake, deep under Eklutna Lake. The intake, together with reinforced-concrete pipe sections, will train water from the lake into the tunnel and eventually into the powerhouse. The subcontract for this work was held by Ben Gerwick, Inc., of San Francisco. The Gerwick organization faced one of the worst mobilization problems on the job because excavation of the intake channel and structure site called for a considerable amount of heavy machinery which had to be moved long distances. There were about 1,000 tons of machinery in the shore equipment alone, and 14 concrete pipe sections, weighing 42 tons each, had to be handled on the Alaskan end after they arrived from Long Beach, Calif.

The best practical method of underwater excavation was by hydraulic dredge, but since no dredges existed in that locality, one had to be built. Its design is unusual because some of the requirements were quite rigid. For example, no part of the dredge could weigh more than 20 tons, so that it could be handled by equipment on the Alaskan end. No part could be more than 10 feet wide, so that the load could clear all railroad tunnels when it was shipped. In spite of these limitations, the dredge also had to be capable of digging up to a depth of 80 feet. The design of the rig, therefore, was a job for experts.

The contractors went to Hydraulic Dredging Co. and Paul Cushing, and Consulting Engineer Jean M. Allen of Los Angeles also entered the picture. The answer was a portable dredge named the "Skookum," which is Indian for "strong". The "Skookum's" hull, 28 x 70 feet, consists of navy pontoons left over from World War II. When these were assembled in Alaska, they were spaced as close together as possible to get all the bouyancy needed by the heavy dredge.

Main power on the dredge consisted of a 600 Quad GM diesel, which drove the 14-inch dredge-pump direct, and also turned a generator shaft which supplied 75-hp to the cutter motor. An auxiliary 60-kw GM-driven generator was available to supply electricity for the hoist, winding gear, and lights.

Because it dug to extreme depths, the dredge customarily used a triangular pattern of anchors and cables, holding down the usual spud-well location in a fixed position. The pump was a 14-inch, four-vane-impeller, centrifugal-type machine, purchased secondhand from another dredging concern. This pump was hooked direct to the 600-hp Quad GM diesel driving the plant.

Possibly the most unusual feature of the "Skookum" was the method by which the ladder was supported. Instead of the customary heavy and high A-frame, a separate set of pontoon tanks was built far in front of the main dredge hull, and the space between it and the main hull was stiffened by open steel trusswork. A low A-frame with heavy blocks, only 10 feet above the water, carried the load on heavy rigging. The ladder hoist line and swing cables, and other used Navy hoist equipment purchased as a part of the original equipment, were reeved back to the American 3-drum hoist aboard the dredge.

A scale replica of the dredge was made in San Francisco, and the machine was carefuly engineered. It was not given a trial run, but was shipped to Alaska as soon as it was finished. So well had the designing engineers done their jobs that the first day's work resulted in 21 hours of effective pumping time.

Dredging Job

The dredging job was such that material could be dumped directly back in the lake. There were 2,000 feet of Naylor 14-inch floating pipeline provided in 40-foot joints for this purpose, and Goodall rubber sleeves connected pipeline sections and provided the necessary flexibility. The pipeline was mounted on Navy-type buoys, which provided enough support to permit capacity digging. In fact, a windstorm in the late stages of the job turned the floating pipeline upside down, but the buoys still continued to carry their load. The pipeline setup was planned only for this one job at Eklutna Lake, and a considerable part of the winter of 1952-53 was used in patching worn pipe, welding discarded bulldozer blades to the cutter, and building the pump impellers with hard-facing.

The material pumped was a glacial clay. It was underlaid by a glacial till which was often in an almost cemented state. About 400,000 cubic yards of digging was involved. Of this total, about 60,000 consisted of the hard, cemented-type material, and it was impossible to dig this formation in place with the dredge without loosening the material.

Softening up was done by rigging up with two Lorain truck cranes on the deck of a barge. These Moto-Cranes handled a pair of high-pressure 4-inch jets, furnished with water under 125 pounds pressure from two Chrysler-driven high-speed pumps. A hole pattern 5 x 7 feet in grid dimension was developed, and the jet pipes were sunk to the projected bottom of the cut. Cartridges of Atlas 60 per cent powder were loaded through the pipe, with a loading factor of about 5 pounds of powder per linear foot of hole for hole depths averaging 15 feet. There were 13 holes across the face of the cut, and all were loaded and shot at one time. Jetting and loading resumed on the next run. The dynamiting operation loosened

(*Continued on next page*)

Goodall rubber sleeves are used on the dredge discharge line. The pipe is floated on Navy-type steel buoys.

A diver goes down into the lake to install one of the intake pipeline sections. *USBR Photo*

Hydroelectric Power For Alaskan Cities

(Continued from preceding page)

up the tight formation of glacial till so that the dredge was able to pump the material away.

Construction of the underwater intake was a tightly scheduled, efficient operation, so well planned that one pipe section was completed each working day. The intake structure consisted of three precast pieces, built on the shore nearby and handled by gantry cranes to the point of placement. The tunnel connection underneath had previously been constructed in glacial till and lined for about 500 feet. Installed in the concrete lining were 2 bulkheads, arranged so that water could not enter the tunnel when it was opened by the dredge. After the necessary excavation had been completed and the tunnel approach was opened, placement of the 16-foot reinforced-concrete pipe joints began.

These pipe sections, fabricated in Long Beach, Calif., were lock-type joints manufactured by American Pipe & Construction Co. The sections were 9 feet in diameter and had concrete walls 12 inches thick. Each section weighed 42 tons. They were shipped to Alaska by boat, unloaded at Seward, and brought by large Kenworth transfer trucks to the Eklutna Lake site high in the mountains. In several places along the route, the trucks had to be assisted up the steep, muddy grade by a Caterpillar D8.

The water of Eklutna Lake, gray with glacial flour, is so opaque that it was impossible for divers to see what they were doing. Pipe sections had to be installed practically by touch. A wooden dock was driven on each side of the pipeline, and a structural steel gantry was built, capable of making the heaviest lifts. One of the intake structure lifts totaled 81 tons. The gantry picked up the pipe sections, carried them to the water's edge, and lowered them gently. A heavy-duty derrick barge then came in and carried the sections to their final position. Access for an inspection of the completed work will be made by closing off the gated intake structure under the lake and removing the bulkheads in the tunnel lining. From all indications, an excellent job has been done on the intake, and the line should be watertight.

Following the construction of the intake and pipeline, backfill was pumped in place by the dredge to cover the line to a depth of about 20 feet. Later, the dredge will be dismantled, taken to Anchorage, and used for deepening the water alongside a shipping dock there.

Meanwhile, work on the 30,000-kw powerhouse has also begun. Rue Contracting Co. has already moved

in with drilling, blasting, and excavating equipment, built the tailrace structure, excavated for the powerhouse foundation, and driven most of the steel H-beam bearing piles. The main part of the concrete foundation is expected to be finished by the end of this year's work season. By January, 1955, the entire job is expected to be finished and the powerhouse in operation.

Personnel

Bureau of Reclamation field work is under the general supervision of L. N. McClellan, chief engineer of USBR. Field forces are headed by L. F. Wylie, assisted by Field Engineer S. S. Westgate, Chief Inspector E. W. Burke, Office Engineer Charles Inman, Survey Chief Al Soliss, and Resident Geologist Murray Athearn.

Palmer Constructors forces are headed by A. M. Coker, one of the partners, who is managing the project. He is assisted by William Nixon, along with D. R. McGregor, project engineer; Al Aiken and Ray Blasongame, tunnel superintendents; and George Mardorf, office manager. Richard Black heads the field forces of Ben Gerwick, and Lyman Lee is in charge for Rue Contracting Co. on the powerhouse.

Data on Electric Shovel

■ A new bulletin describes the Marion 111-M Ward-Leonard electric shovel. The unit carries a standard 4-yard dipper or bucket and is used as a shovel, dragline, clamshell, and crane. As a dragline, the bucket capacity varies from 3 to 4½ cubic yards depending on the length of the boom. Its rated crane capacity is 165 tons.

The 12-page booklet contains illustrations of the unit in many material-handling applications.

To obtain this literature write to the Marion Power Shovel Co., 617 W. Center St., Marion, Ohio, and request Bulletin No. 408, or use the Request Card at page 18. Circle No. 130.

AISC Publishes Book on Iron and Steel Beams

The first historical record of dimensions and properties of all iron and steel rolled shapes of the past 79 years has been published by the American Institute of Steel Construction. Entitled "Iron and Steel Beams, 1873 to 1952", the publication is primarily for the assistance of architects and engineers who are remodeling or constructing additional floors to buildings erected 40 or 50 years ago.

Tabular data is limited to wrought iron beams and columns, since other sections were standardized at an early date and have changed little. Of interest are the unit stresses recommended by early manufacturers, which will be found conservative in the light of present-day recommendations. Also included are American Society for Testing Materials specification requirements for tensile strength and yield point.

The price of the book is $3.50 and may be ordered from the Institute at 101 Park Ave., New York 17, N. Y.

Prestressing Elects

James J. Mennis was elected president and general manager of Prestressing, Inc., San Antonio, Texas, at the annual stockholder's and director's meeting held by the corporation.

Fred E. Koebel was elected vice president and chief engineer; L. R. Eastman, treasurer; and M. Paige, secretary. William T. Rhame was named chairman of the board of directors, which includes Mr. Mennis, Mr. Eastman, M. G. Ensinger, and J. V. McGoodwin.

Masonry Surfacer

■ A new silicone water repellent for masonry is made by Haynes Products Co., 4007 Farnam St., Omaha 3, Nebr. Hayproc water repellent is also said to eliminate staining and efflorescence. It dries in 12 hours and is invisible thereafter.

A feature of the surfacer is that it may be applied at temperatures as low as zero degrees F and is suitable for practically all types of masonry surfaces. The sealer is recommended for outside walls above ground level.

The company also makes Formula No. 640, a product to be used below grade.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 20.

Floating Road Presents Unique Job Problems

Swamps along Louisiana Gulf Coast are conquered as state builds secondary access road with a future

IN THE SWAMPY, remote Gulf Coast wilderness of Louisiana's "Cajun Country", where for 75 years and more the only means of transportation was by mud boat or pirogue, the Louisiana Department of Highways has built a new road. It is a road with a future, but its type has had few precedents. Highway textbooks contain little information of any help in building a road of this kind.

Do textbooks tell, for example, how to negotiate a right-of-way purchase with an excitable, highly emotional Frenchman? Who can say to such a man that there is a necessity for such a facility? What formula for effective working time have highway engineers invented and recorded to show what percentage of time draglines might be down because of mosquitoes too big and too vicious for any operator? How far can you go with survey chaining in a swamp which has no bottom, but plenty of top? What do you do about snakes as big as a man's arm?

Such problems are routine on this road.

This unusual, interesting piece of construction is a 16-mile section of Louisiana State Route 26, from Forked Island to Pecan Island along the Gulf near the new Intercoastal Canal. The highway is all in Vermilion Parish. Although the highway is now being built as a part of stage construction as a secondary access road, there is little doubt that it will some day be used as a part of a high-speed connecting link between New Orleans and Houston.

In fact, bonds have already been sold to finance a new toll bridge and causeway across Sabine Lake near Port Arthur, Texas, and the Louisiana Department of Highways is now thinking of making an addition to the 16-mile Pecan Island road, which would extend it westerly about 30 miles and complete that state's section of the new Gulf Coast Highway.

Much of the 16-mile Pecan Island road is only 6 feet above the level of the nearby Gulf of Mexico. There is no foundation, especially in places where surveyors found they could poke 16-foot 2x4's to full length without touching anything that offered resistance. In spite of these adverse conditions, the new highway is being built on an artificial embankment 6 feet above the low swamp. The road has a crowned roadbed 36 feet wide, with 3 to 1 slopes, an over-all road base 72 feet in width.

F. A. Consterdine, resident engineer on the new road built across swampy area in Vermilion Parish, La., stands beside one of the road's secondary-highway signs. *Ray Dav Photo*

and a 50-foot beam. It's right-of-way is wide enough to accommodate a nearby borrow pit, measuring 57 feet across the top, with 2 to 1 slopes both front and back.

Over the top of the earth work, a 36-foot, 6-inch-thick layer of oyster, clam, and reef shells is being placed, mixed, and compacted to form a surface which will take temporary traffic. The planning, design, and construction of the highway is an almost incredible story of danger, hardship, ingenuity, and almost impossible roadbuilding conditions.

Mean Surveying!

The new road pierces some of the toughest roadbuilding country anywhere, despite the fact that the terrain is almost perfectly level. Starting near the Louisiana town of Abbeville, the route heads southwestward, and drops the few remaining feet in elevation toward Gulf level. It quickly reaches a level hardly more than a few inches above the water. The route leads out through wooded sections, and soon reaches open marsh typical of this part of the state.

The reclamation of these marshlands by a levee and drainage method is transforming thousands of acres into rich ricelands, which is part of the reason for construction of the new road. The highway crosses both the new and old Intercoastal Canals by means of free ferries, and then heads for miles across low, flat, almost bottomless marsh country. About 16 miles after leaving from Forked Island near Abbeville, the highway reaches Pecan Island, one of the picturesque settlements little known or written about.

Pecan Island itself is a long oyster-shell reef, built up at some ancient time in the bottom of the Gulf. It is only from 150 to 450 yards wide. The top of the island is about 10 feet above sea level, and over the years numerous moss-covered oak trees have sprung up and grown. For about 75 years, a settlement of 150 people was located on the island, isolated for all practical purposes from the rest of Louisiana. Their only mode of transportation to Abbeville was by mud boat or pirogue, which meant a day-long journey.

These people fished, hunted, trapped, farmed, raised cattle, and even raised a few bales of cotton, which were shipped out by boat.

It was from these people that surveyors from the Highway Department learned something of the location and staking of the new highway. For a number of months, surveyors used the traditional mud boats, small, flat-bottomed scows powered usually by a Ford V-8 inboard engine and having a weedless-type propeller. Even loaded with a survey crew of four men, the boats moved along through the small marshy canals at 18 to 20 miles per hour.

Much of the initial transportation during negotiation was done entirely by the mud boats since there was no other way to get to the island.

When actual surveying started, "swamp buggies" came into vogue. Swamp buggies are ungainly and cumbersome in appearance, but marvelously efficient for swamp surveys. They have light, powerful engines, usually a Ford V-8 or a GM diesel. Their wheels consist of broad drums, sometimes made watertight so the machine can waddle through water as easily as it crawls across land. The bearing cleats, which give traction in swamps, also act as swim fins when the machine is in water.

Swamp buggies proved to be invaluable to surveyors making the final location, because instead of having to cut transit lines at great

(Continued on next page)

Floating Road Presents Unique Job Problems

(Continued from preceding page)

labor cost through water-moccasin infested growth as high as a man's head, the wheels of a swamp buggy were placed on a transit line, and the machine moved down that line, smashing grass and marsh growth in its way. In the construction survey, it was necessary to place a row of stakes for the center line, the toe of slope, the end of the berm, and another line of stakes on each edge of the borrow pit.

By using swamp buggies to run these long lines in on both sides of the road, an enormous amount of surveying labor was saved.

Three Construction Contracts

Three construction contracts were necessary to get the road finished. In July of 1950, a $289,386 contract was awarded to Franzen Construction Co., calling for 803,758 cubic yards of common excavation, 326,126 cubic yards of muck excavation, and 2,822 linear feet of 36-inch corrugated metal pipe, placed every 1,000 feet to act as equalizers for hydraulic forces in the swamp on both sides of the highway. The pipes will also serve as passageways for muskrats, mink, and Argentine nutria—fur bearing animals owned by Louisiana Fur Co.

Franzen's contract called for the construction of eight miles of the road near the south, or Forked Island, end. In 1951 another eight miles was let under a $222,670 contract to Forcum-James Co., of Memphis, Tenn. This contract involved 222,500 cubic yards of excavation from borrow, and 29,500 cubic yards of common excavation. Still later, contracts were let to Pankey Wheat. These two contracts totaled $146,136.00, and called for the production and laying of 65,506 cubic yards of shell surfacing over the graded highway.

On Forcum-James' job, which was in higher ground, a fleet of 9 Euclid bottom-dump hauling units of 15 to 20-cubic-yard capacity hauled material, which was supplied by dragline, from several deep borrow pits along the right-of-way. Since these borrow pits were closer to higher ground, a fairly good stiff clay was found which made a satisfactory roadbed. The clay was spread out by dozers and compacted by the passage of hauling equipment.

The Franzen excavating job was considerably different. It carried the highway across a section of floating turf, where the foundation was indefinite and could not even be found in places. Under the swamp quaking surface, there appeared to be nothing but soft organic ooze to an unknown depth.

Franzen used Lima and Bucyrus-Erie 2½-yard draglines, equipped with 80-foot booms, to pick up the dirt work for this job. The upper 12 inches of the swamp was first excavated, and the material was discarded on both sides. Part of the material was used to make a small levee at the back of the borrow pit. Part of it was used for an intercepting levee at the back of the borrow pit limit. Franzen then blocked, with small earth dikes, sections of the borrow pit about 6,000 feet long. A 30-inch pump was then brought in, set up, and put to work pulling as much water as possible from the pit. This scheme worked fine, but was too costly to continue.

After that idea was discarded, the

draglines moved in on large timber mats, excavated, and cast the material into the roadway, where it was spread by dozers and, much later, dressed by motor graders. In this swampy section, compaction was done mostly by this method, and the embankment was allowed to settle for a considerable length of time before further surfacing work was done. Consequently, progress was slow, but the jobs were finally completed and only about 12 inches of ultimate settlement is expected in the 6-foot fill.

Pankey Wheat's job, calling for shell surfacing, is now moving along rapidly. Several types of shell surfacing are being used. A native shell from pits along Pecan Island was originally designated, along with alternates calling for oyster and reef shells. The Pecan Island shell was satisfactory, but Wheat considered the haul much too long for sound contracting. After completing several miles near Pecan Island, he obtained State permission to use the alternate, calling for 65 per cent clamshells and 35 per cent reef shell, the common designation for oyster shell.

The shell is being produced from a local bay 15 miles away from the project. A total of 16 steel barges are being used to transport this material; large barges haul 400 cubic yards per trip, and small barges average 250 cubic yards each. The barge trips are scheduled so that while four are enroute to the job, four are going away from the job, four are being unloaded, and four are at the dredge being loaded. Two tugs are used to keep the barges moving.

A P&H Model 655 machine, equipped with an Owen clamshell bucket, is uloading the material to a fleet of six dump trucks, consisting of GMC's, Fords, and Chevrolets. Capacity of these trucks is 5, 6, and 8 cubic yards. As the trucks haul the material out to the project, they first dump reef shell, then place the 65 per cent clamshell material on top. After this, the material is blademixed by an Allis-Chalmers AD-40 motor grader. An Allis-Chalmers HD-9 tractor with a Gar Wood dozer is also available for spreading the material.

Following the motor grader blademix, a 15-wheel Grace pneumatic roller, pulled by a rubber-tire International tractor, is used for compaction. Truck tires passing over the shell also add their measure of compaction.

Later on, after the highway has been used and has been able to settle for several years, 12 to 15 inches more of shell will probably be placed. Eventually, a bituminous surface will top the road out to make it an all-weather highway. When new sections west of Pecan Island have been completed and the road joins the Sabine Lake toll bridge, a fast new highway will have been created for through transportation and many miles and hours of driving time will be saved for motorists who now must pass through New Iberia, Lafayette, and other congested towns.

Personnel

General supervision of all the work was out of the Lafayette District office, with J. E. Jarman as district engineer. F. A. Consterdine was resident engineer, and Pankey Wheat is directing his own operations.

You can save a life by ordering a $10 CARE food package for a needy person overseas. Send to: CARE, 20 Broad St., New York 5, N. Y.

Torque-Release Wrench In Inch-Pound Models

■ Six torque-limiting wrenches calibrated in inch-pounds have been added to the line made by the Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles 54, Calif. Like the company's foot-pound models, the Proto wrenches release at the proper torque setting and reset themselves automatically.

The wrenches have no dials, pointers, scales, or other projections to watch for. They have an enclosed spring as the principal torque controlling element, and have a micrometer-type adjustment. Ratchet-head models do the work of both a torque wrench and ratchet.

Capacities of the new torque wrench are 100 to 750 and 700 to 1,600 inch-pounds. Three models have a plain head and three have a built-in reversible ratchet head Drive sizes are ⅜ and ½ inch.

For further information write to the company, or use the Request Card at page 18. Circle No. 33.

Aeroquip Acquires Plant

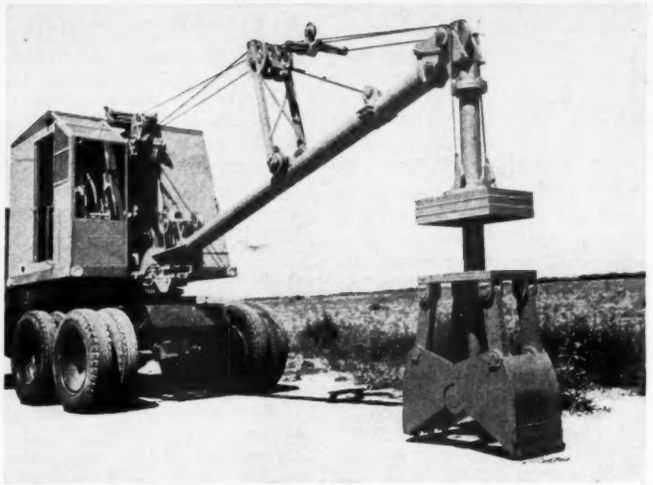
Aeroquip Corp., Jackson, Mich., which has purchased the Sterling Electric Motors plant in Van Wert, Ohio, has named Don T. McKone, Jr., general manager of the plant. Mr. McKone was formerly assistant general manager of Aero-Coupling Corp., a west coast subsidiary of Aeroquip.

The company, manufacturer of flexible hose lines, has also added about 5,500 square feet of floor space to the Aero-Coupling plant in Burbank, Calif., as part of its expansion program.

Impact Drives Bucket Through Hard Material

■ A new type of excavating bucket, made to dig through hard materials, is announced by the "Quick-Way" Truck Shovel Co., 4150 Josephine Ave., Denver 1, Colo. The new bucket is suspended from a specially designed frame, and a new hammer drops on the bucket with a pile-driver action to drive it into black-top, shale, macadam, and other hard-to-penetrate surfaces. The hammer impact travels through coupling arms from the base of the hammer plate straight to the teeth of the bucket.

When the hammer is not needed, it can be bolted to the bucket head to provide the same digging weight as it does if used as a hammer. Interchangeable hammer weights can be added or taken off to fit conditions. The attachment is made so that it will swivel at different angles for work in close quarters.



The new "Quick-Way" hammer-drive bell-hole digger, grapple, and materials-rehandling bucket. It is available in various sizes.

The bucket closes with a single line, giving faster action than a conventional bucket. There are no sheaves or counterweights inside the bucket, and sliding weight is where it is most effective.

The same attachment is also recommended as a materials-handling bucket as well as a jawed grapple for picking up rubble, blocks of cement, big rocks, pipe, poles, and logs.

With a trench hoe boom, it digs to a depth of 10 feet or more when provided with suitable extensions. With a crane boom, it digs to 30 feet or more. The bucket is offered in various sizes to meet different needs. It works with two or four jaws.

For further information write to the company, or use the Request Card at page 18. Circle No. 82.

Personnel Manual Issued

The Oklahoma State Highway Commission has approved a personnel manual which is being made available to all state highway departments. The booklet includes complete listings on classification of highway employees, minimum requirements for employment, and the revised salary schedule for highway employees. The latter part of the book is devoted to personnel policies.

Managers Join De Walt

Wallace M. Kunkel and Ross C Stevens have been named district sales managers by De Walt, Inc., a subsidary of American Machine & Foundry Co., Lancaster, Pa., manufacturer of a line of industrial radial-arm cutting machines and home woodworking machines. Mr. Kunkel will cover northern New Jersey, and Mr. Stevens' territory will comprise Connecticut and Westchester and Putnam counties in New York.

Stud Welded Fasteners For Securing Insulation

■ How to secure various types of insulation with stud-welded fasteners is told in literature from the Nelson Stud Welding Division, Gregory Industries, Inc., 2715 Toledo Ave., Lorain, Ohio.

Basic types of fasteners covered include headed insulation studs for attaching Fiberglas to steel, and slotted lagging studs through which wires can be threaded to secure magnesia, Kaylo, and other block-type insulation. The literature also lists headless studs over which Fiberglas, foam glass, felts and cork products, rock, or vegetable fibers can be impaled before the installation of a retaining speed clip. Split studs are also shown for welding through predrilled block material, such as magnesia and Kaylo, or for securing insulation that can be impaled.

Also illustrated are rectangular metal lath studs for use in attaching wire mesh for guniting, for fireproofing columns, and as a means of securing banding wires used to retain block-type insulation.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 98.

Truck-Weighing Unit Towed to Check Point

■ A mobile truck weighing station that simplifies the problem of weighing tandem-axle semi-trailers is in production at The Gledhill Road Machinery Co., Galion, Ohio. The unit can be pulled by a patrol car or jeep to any weighing point.

The mobile weighing station consists of a trailer frame and four scales mounted on ramps. A hydraulic lever lowers the ramp and scales to the pavement, and the unit is ready for operation when the trailer is pulled out of the way. The scales and ramps are returned to the trailer frame by the same hydraulic lift.

The trailer ramp measures 4 inches high, 80 inches long, and 96 inches wide. With the ramp secured to the trailer, the entire weighing station is less than 30 inches high.

Inventor of the weighing unit is U. C. Felty of the Ohio State Highway Patrol. The weighing station is recommended for state highway organizations.

For further information write to the company, or use the Request Card at page 18. Circle No. 61.

Aluminum in Structures

■ Number 21 of Reynolds Metals, *Technical Advisor* features an article on designing with aluminum. It includes details on how weight savings can be effected by choosing aluminum structural parts having the same strength and rigidity as comparable wood and steel structures. Also presented is a pictorial sequence on the use of aluminum in pipe lines for river crossings, heat exchangers, and other items.

A question-and-answer page features information on joining tube ends, soldering aluminum, infra-red reflectivity, aluminum arrows, terrazzo floor strips, storing alloys, and forming springback.

An article on finishes for aluminum is also in this issue.

To obtain this literature write to Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky., or use the Request Card at page 18. Circle No. 133.

Hercules Powder Appoints

J. B. Johnson, general manager of the Explosives Department of Hercules Powder Co., Wilmington 99, Del., has been elected a vice president and a member of the executive committee. Succeeding Mr. Johnson is John M. Martin, assistant general manager of the department.

William R. Ellis, who resigned as a member of the executive committee, will continue as a vice president and director of the company.

LeRoy Keane, director of sales, and Harry V. Chase, director of operations, have been named assistant general managers of the Explosives Department.

Clarence W. Ballard has succeeded Mr. Keene as director of sales, and Jack D. Hayes, Jr., has succeeded Mr. Chase as director of operations. George A. Parker assumes Mr. Ballard's post as manager of the explosives sales office in Pittsburgh, Pa., while Philip R. Hammond has been named assistant manager of the Pittsburgh office.

A tandem-axle trailer weighs in at a portable scale towed to check point.

Marion Has 30th Birthday

Marion Metal Products Co., Marion, Ohio, manufacturer of dump bodies and hoists, is celebrating its 30th anniversary this year. It was founded in 1923 by T. H. Clarke and E. H. Fishmer. The most active pioneer was industrialist J. Malcolm Strelitz, who was president when he died last year.

The firm has grown from a 5,000-square-foot shop with 20 employees to a 160,000-square-foot plant employing 320 people. Besides developing the hoist, Marion has manufactured welded steel furnaces, steel form-holding racks, steel shovel cabs, bulldozer parts, and traction crawlers.

The Kremser Hi-Lo conveyor.

Portable Conveyor's Low Pick-Up Height

■ A portable conveyor that has a power-operated screw lift and lowering device is announced by Frank A. Kremser & Sons, Inc., 3435 N. 5th St., Philadelphia 40, Pa. The unit raises to any angle and is suitable for stacking, storing, loading, and unloading bags, boxes, and cartons. It can be used to carry packages from floor to floor where elevators are not available.

The conveyor is built to load low to the floor and has no obstruction at the loading end, so that pick-ups can be made with little effort. There are no sides to interfere with extra-wide packages. Removable rubber cleats every 60 inches on the 3-ply corrugated belt prevent tearing of bags and packages. A reversible motor permits instant change of direction for loading or unloading.

The Kremser Hi-Lo conveyor moves on swivel casters and folds in half for storage. Four sizes are available.

For further information write to the company, or use the Request Card at page 18. Circle No. 92.

Texstress Firm Formed

A new corporation, Texas Stressed Concrete Corp., 1213 Richcreek Road, Austin, Texas, has been organized by five firms and will operate as a specialty contractor or subcontractor in the field of prestressed concrete. The corporation will quote general contractors on the items of furnishing, placing, and stressing high tensile, high carbon wire to requirements. "Texstress" will use methods developed by Prestressing, Inc., of San Antonio. It will offer subcontract bids, cost estimates, design criteria, and suggestions to architects, engineers, and general contractors on request.

Ted J. Gut is general manager of the firm, which is composed of the Texas firms of W. S. Bellows Construction Corp., Houston; McKinney Drilling Co., Nacogdoches; Harry Newton, Inc., Graham; and H. B. Zachry Co. and Texstar Corp., both of San Antonio.

NSC Offers Pamphlet

The National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., has made available a leaflet entitled "How to Prevent Falls". The cartoon booklet gives safety hints to workers and may be ordered from the Council.

Device Removes Fumes From Gas-Engine Exhaust

■ A device for removing carbon monoxide fumes and odors from the exhaust of gasoline-powered equipment is described in a folder from Oxy-Catalyst, Inc., Wayne, Pa. The literature stresses that the OCM catalytic exhaust permits safe operation of gasoline engines indoors, as well as in many places previously thought impractical, such as tunnels. Used at present on lift, dump, and tow trucks, the equipment is being applied also to other gasoline-powered construction machinery.

By chemically burning out harmful unconsumed gases, the device reduces carbon monoxide to a safe level and helps purify air. It is available already installed on new equipment or can replace present mufflers.

A chart in the folder shows the results of physiological comparison tests for two industrial trucks equipped with standard mufflers and the same trucks equipped with OCM catalytic exhausts.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 119.

Ferguson Adds New Office

The H. K. Ferguson Co., engineering and building firm of Cleveland, Ohio, has opened a district sales office in the Forsyth Building, Atlanta, Ga. R. G. Sieder, contract representative, will be in charge. He has been with the company for eight years and has served as assistant construction supervisor, construction superintendent, and assistant project manager.

Besides Georgia, the district includes Tennessee, Alabama, Florida, North Carolina, and South Carolina.

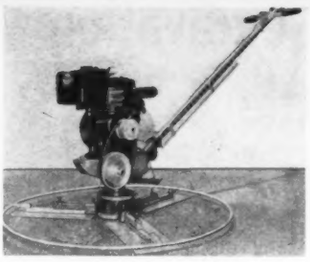
Hustles with t

Railside commercial site prepared fast by pair of International TD-14As

"THEY'RE POWERFUL AND FAST," owner Harold J. Anderson tells reporter in describing the performance of his two TD-14As.

New Concrete Finisher

■ An improved version of its concrete floating-finishing machine is announced by the Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles 39, Calif. The Model J-1 has a new gear case that is Timken-bearing equipped to increase efficiency and reduce wear. A new safety switch on the handle shuts off automatically when the operator releases his grip. New ball thrust bearings at the top of the handle and at the base are said to make trowel-pitch adjustment easier when the machine is operating. A new rubber collar



around the base protects the trowel adjustment arms.

The finishing machine also has a new Briggs & Stratton 4-cycle air-cooled engine. Other features include snap-on trowels and a centrifugal clutch which automatically tightens belt and trowel pitch.

The trowel diameter is 34 inches, so that the machine may operate in small and crowded areas.

For further information write to the company, or use the Request Card at page 18. Circle No. 94.

Safety in Space Heaters

■ One of the most important points to check in choosing a space heater is safety, according to a booklet from the Herman Nelson Division of American Air Filter Co., Inc., 1824 Third Ave., Moline, Ill. The pamphlet describes how the manufacturer's portable heaters have met the problem of safety.

All heaters in the company's line are vented to carry off combustion products. The units also feature a sealed-flame principle of construction and automatic controls to eliminate the risk of carbon monoxide and other fumes, as well as dangerous sparks and smoke or soot. The heaters can be used inside or outside and can spot warm air to the area to be heated by flexible canvas ducts.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 86.

New Engine-Generators Are Gasoline Driven

■ Two gasoline-driven electric plants, rated at 10,000 and 15,000 watts ac, have been added to the line of engine-generators manufactured by D. W. Onan & Sons, Inc., University Ave., S. E., Minneapolis 14, Minn. The new HQ models are powered by Continental 4-cylinder, water-cooled engines and are designed for both primary and standby applications. Features of the unit include an impulse-coupled magneto with special radio shielding, said to make starting easier and faster.

A small 10½-quart cooling system needs less anti-freeze for outdoor winter operation. Fuel consumption for both plants is under one quart per kwh at full rated load, according to the manufacturer.

A new Onan-built generator for the HQ models features voltage regulation of plus or minus 2 per cent. The generator is capable of starting motors on the basis of 2,000 watts per horsepower and maintaining 80 per cent of rated voltage with a load on the motor. All generators are direct-connected to the engine by a semi-flexible drive disk.

The new electric-generating plants are available in all standard voltages, frequencies, and phases. Both 10 and 15-kw units are offered in housed and unhoused models. A sliding battery rack permits easier servicing of batteries.

For further information write to the company, or use the Request Card at page 18. Circle No. 120.

Soil Testing Services Opens New Facilities

Soil Testing Services, Inc., has announced the opening of its new offices and testing laboratory at 3529 N. Cicero Ave., Chicago 41, Ill. Activities of the corporation are directed by John P. Gnaedinger, president, and Carl A. Metz, vice president.

The firm operates a fleet of truck-mounted core drill rigs for making soil borings and rock corings. Other services include laboratory test facilities for engineering tests on soils, field inspection for placement of foundations and controls of compacted fills, engineering reports and recommendations for the design of foundations, and sand, gravel, and clay quarry site evaluations. The engineering staff is also available for consultation on problems of soil mechanics and for conducting research projects.

Tough excavation work on Tuttle Creek Dam

Clay, shale, and rock present varied job problems on flood control project in Kansas

Rock is spread on the embankment by one of the Euclid end-dumps.
Houck Photo

TUTTLE CREEK DAM, a key flood-control project in the Kansas and Missouri River basins, will be able to pay for itself through savings in flood damage. Its total cost of $87,759,000 will seem a trifling amount to pay for a substantial flood crest reduction at Kansas City if floods similar to those of 1903 and 1951 should be repeated.

Completed projects in the Missouri River basin have already prevented $500,000,000 in flood damage for 1951 and 1952, according to Colonel L. J. Lincoln, Kansas City District Engineer, U. S. Army Corp of Engineers. He based his figures on a recent tabulation of rivers' flow and impounded-water quantities, as compared with the time when water ran wild.

Tuttle Creek History

After 14 years of delay and controversy, a contract for Stage 1 embankment, spillway, and conduit, was awarded September 16, 1952, to George Bennett Construction Co., Kansas City, Kans., on a low bid of $2,234,604, which was $700,000 under the estimate.

The dam was authorized by Congress in 1938, but only meager funds were allotted for it until 1952. Then Congress granted $5,000,000 for the project, following the multibillion dollars in flood damage in Kansas City, Mo., and Kansas City, Kans., in 1951. Previously, only $750,000 had been spent for plans and surveys.

Reservoir Area

Tuttle Creek Dam is located on Big Blue River, six miles north of Manhattan, Kans., and 12.3 river miles upstream from the confluence of Big Blue and Kansas Rivers.

Big Blue River, 290 miles long, drains 9,600 square miles, including 7,216 miles in Nebraska. Principal tributary is Little Blue, draining 3,497 square miles and entering the main stem at Blue Rapids. Reservoir and dam occupy 53,500 acres. At the full pool level of 1,136 feet, the lake will extend 50 miles upstream and occupy portions of Pottawatomie, Riley, and Marshall counties. Its storage capacity will be 2,280,000 acre-feet.

Water will be impounded by the dry-type dam only during flood seasons, with provision made for normal river flow at all other times. This will allow the government to lease 30,000 to 40,000 acres in the reservoir for grazing and farming and to set aside 75 per cent of the fees to go into local school and road funds.

Relocations

As with work on all dams, there are some relocations required. High-level relocations of 59 miles of single track are necessary for the Atchison-Stockton branch of the Missouri Pacific Railroad in Kansas, and the Manhattan-Lincoln branch of the Union Pacific Railroad in Nebraska.

Other relocations include 229

D8 tractor with a Fleco rake spreads rock at the top of the embankment.
Houck Photo

Compaction is achieved with this Tampo 50-ton roller, pulled by a Caterpillar D6 tractor.
Houck Photo

miles of telephone and electric line and 12 miles of oil and gas line. Only part of the 62 miles of federal and state highways and 110 miles of county roads will be relocated. Kansas 13 will be rerouted over the crest of the dam.

The Dam

Tuttle Creek Dam is a rolled earth and shale embankment 7,500 feet long, with a maximum base width of 1,640 feet and a maximum height of 157 feet.

Elevations Above Sea Level

Top of dam	1159 ft.
Flood plain	1022 ft.
Base	1022 ft.
Crest of spillway	1116 ft.
Top of crest gates	1136 ft.

The embankment will have an impervious core, constructed partly of material from required excavations. The remainder will come from borrow. Most of the shale fill in berms and upstream portions of the valley, terrace and transition sections as well as rock fill, comes from excavations for spillway and outlet works.

One problem was to classify and evaluate the quality of a wide variety of materials on the site. For instance, limestone-types were hard, medium, or soft, while shale-types were hard, usable, or worthless. Water-holding clays were excavated and replaced with sand.

Big Blue River Basin is underlaid by several thousand feet of sedimentary rocks, with shales alternating with limestones and lesser amounts of sandstone. Upper Cretaceous shales and chalky limestones make up more than half the upper basin, where bedrock is covered with from 20 to 200 feet of consolidated loess silt and alluvial sands. Some glacial clay is 100 feet thick with only a thin loess mantle. On the east side of the basin, bedrock is covered with 10 to 100 feet of silt and clay underlaid with sand and gravel.

Shales vary from less than 2 feet to 36 feet. Limestones vary from 2 to 18 feet, and are thin to thick-bedded, and general medium-hard to soft, with some dolomite and chert nodules which require careful classification.

Test Fills

To check different materials for compaction, shear values, pervious qualities, water content, and best use, ten test-fill embankments were placed on existing ground surface about 500 feet upstream from dam axis.

Average moisture content was 26 per cent, while moisture content for optimum compaction ranged from 15 to 18 per cent. However, optimum compaction curves indicated that a dry density of 100 pounds per cubic foot could be obtained with a 20 per cent moisture content.

Excavation and Fill Quantities

Stripping	450,000 cu. yds.
Foundation excavation	1,150,000 cu. yds.
Borrow, Bluff	552,000 cu. yds.
Pervious fill	5,600,000 cu. yds.
Impervious fill	4,240,000 cu. yds.
Berm fill	2,540,000 cu. yds.
Random impervious fill	327,000 cu. yds.
Shale fill	4,960,000 cu. yds.
Dumped rock	430,000 cu. yds.
Rock fill	2,725,000 cu. yds.
Select sand fill	2,544,000 cu. yds.

Only nominal stripping is required for the left abutment. However, a space between the left end of the embankment and spillway adjacent to the outlet conduit and a space of several hundred feet in right abutment will be grouted against excessive seepage. Poorly drained foundation clays are being excavated and replaced with sand. The design saves concrete by making use of sand which is available from required excavations upstream

(Continued on next page)

Tuttle Creek Dam

(*Continued from preceding page*)

and downstream. Engineers say this permits a certain amount of narrowing and increases shear strength. Underseepage is also controlled by pressure-relief wells at the downstream toe.

Soil formation at the site has two layers—8 to 27 feet of clay and silt top 23 to 70 feet of sand and gravel.

Spillway

The spillway site is in a saddle in the left abutment, a few hundred feet beyond the end of dam. Here, an ancient fault was found with a down-throw of 30 feet away from spillway structure. The fault passes a few hundred feet from the left side of the spillway and continues upstream, going under part of the approach channel. Although Corps geologists say it is no longer active and is tightly sealed with shale from fault plane walls, it will be carefully traced and pressure grouted.

Crest weir and gate structure are based on the Sallyards limestone at elevation 1,089. The Sallyards is less than 3 feet thick but is thick-bedded and hard. Engineers say it will provide ample support for the structure and distribute part of the load over the underlying Roca shale.

The downstream slab will rest on Salem Point shale, Burr limestone, and Legion shale. A toe wall will extend down through the Roca shale, and one foot will go into the Howe limestone. The Burr and Howe will be grouted against underseepage. The higher Neva and Cottonwood will be grouted around the sides of the spillway excavation.

The chute-type spillway has an ogee crest at 1,116 and is controlled by twenty 40 x 20-foot Tainter gates, separated by 8-foot piers. The gross curved crest-length of the spillway weir is 952 feet. The spillway is paved with concrete for 600 feet downstream from centerline and terminates in a flip-bucket which deflects flow upward and minimizes erosion at the end of the paved apron.

The approach channel, which leads to the spillway from a point in the reservoir 1,400 feet upstream, is approximately 1,600 feet long and has a base width of 1,050 feet. Excavation consists of 560,000 cubic yards common, and 7,470,000 cubic yards rock and shale. Flow is discharged into a 9,300-foot-long combination outlet and pilot channel, which discharges into the Blue River 4,500 feet below the dam. Peak discharge rate is 570,000 cfs.

Outlet Works

The outlet works has an approach and outlet channel in the valley on the right bank, consisting of intake structure, conduit, and stilling basin. The intake has trash fenders, four tractor-type 10 x 20-foot control gates that provide impounded-water control and stream-flow regulation, and two 10 x 20-foot emergency gates. The main barrel of the 912-foot conduit is a horseshoe-shaped twin 20-foot concrete structure, with 60-foot-long transition sections near the upstream and downstream ends. The conduit divides to form two 16 x 20-foot openings upstream from the stilling basin.

Outlet works excavation amounts to 2,142,000 cubic yards common and 626,400 shale and limestone, Maximum outlet capacity at pool level of 1,136 feet is 45,000 cfs. Invert elevation is 1,002 feet at intake and 1,000 feet at outlet.

Stilling Basin

The reinforced-concrete stilling basin at the outlet end of the conduit is designed to produce a hydraulic jump for dissipation of energy, reducing erosion at the outlet channel. The basin is 290 feet long and a training-wall divides it into two uniform sections which increases each in width from 16 feet at the conduit exit to 73 feet at the basin end-sill. The floor at elevation 972 has two rows of baffles. An end sill, with its top at 995 feet, leveled off with firm limestone, is provided at the downstream end.

A 110 x 3,700-foot approach chan-

Studying Tuttle Creek Dam plans are, left to right, B. V. Reany, U. S. Army Corps of Engineers' project engineer, and Boyd (Pete) Wilson, general superintendent for the George Bennett Construction Co.

Houck Photo

nel leading to the outlet works diverts stream flow during closure. A 160-foot-wide outlet channel carries water from the stilling basin to Big Blue's main channel, 3,400 feet below the dam.

The concrete-lined basin is based in Hughes shale, and its outlet channel side slopes are in weathered Johnson shale, which will be reinforced with riprap.

Excavation

The contractor assigned four Caterpillar DW21 tractors, 18-yard DW21 scrapers, and two 16-yard Euclid scrapers to the clay digging job at the outlet works. This was a rugged job, but by using a Caterpillar D8 as a pull cat, and another as a push cat, he succeeded in establishing a 55-second routine for loading scrapers. Four other D8's and an Allis-Chalmers HD-9-G Tractoloader were on the job.

Rock excavation in the spillway was handled by two 80-D Northwest 2½-yard shovels, which loaded into a mixed fleet of dump trucks: five Euclid 10-yard end-dumps and six tandem-drive 7-yard Whites.

Rock was broken with Du Pont 40 per cent gelatin dynamite. It was loaded into 7-foot holes, drilled with two Joy wagon drills and Timken detachable bits, and powered with an R600 Ingersoll-Rand Gyro-Flo compressor. About 300 holes were usually loaded and shot in delayed-action sequence.

Rock and shale fill contributed to job problems. The contractor crushed shale on the ground with a Gebhard Model 22 chisel-tooth roller, specially made by Shovel Supply Co., Dallas, Tex. Boyd (Pete) Wilson, general superintendent, said he was moving 7,000 cubic yards of material per shift with 128 men on the job.

The spread of rock was facilitated with two D8's equipped with Fleco rakes. A Tampo rubber-tired 50-ton compactor with a D6 tow cat was the main compaction unit. A No. 12 Caterpillar grader completed the spreading equipment.

Work roads required periodic sprinkling, and additional water was needed in some fills to meet compaction specifications. For this purpose, the contractor had three water trucks with capacities of 1,500, 2,500, and 800 gallons.

Concrete Plant

Concrete work and a temporary work bridge over the river was subcontracted to Tobin-Barcus Construction Co., Kansas City, Mo.

The concrete plant, a Koehring-Johnson 400-ton automatic hydraulic electric, has two 2-yard Koehring mixers on the tower. A Johnson cement silo holds 1,032 barrels.

Aggregate is stored in four 900-cubic-yard ground bins supplied by railroad cars on an adjacent siding. Sand and ¾, 1½, and 3-inch rock are loaded from cars to bins by an Owen clamshell on a 1-yard Northwest crane. A Barber-Greene 218-foot conveyor was installed in a 9-foot ID tunnel underneath the bins to feed a 285-foot Barber-Greene Model 76 conveyor. This lifts materials from the bins to the mixing hoppers in the 85-foot tower. Concrete capacity is 4 cubic yards every three minutes. Four 2-yard Gar-Bro buckets are used to place concrete. Structural steel members are handled by a 2-yard Marion equipped with a 70-foot boom and a 10-foot jib.

Temporary Work Bridge

The 623-foot work bridge consists of 15 spans, ranging from 31 to 60 feet. The 132-pound WF I-beam girders, 6 x 14 inches and 33 feet long, are supported on 19 double pile bents and two single pile bents. There are 12 spaced on 30-foot 9¾-inch centers; four spaced on 32-foot, and three on 30 and 31-foot centers.

Double pile bents used sixteen 65-foot timber piles, driven to refusal at a ⅜:12-inch batter, with each half bent of eight piles X-braced with bolted 3 x 10-inch timbers. Pile caps were 12-inch WF 65-pound I-beams, attached to each pile with ¾-inch drift bolts that had 15-inch minimum penetration with two I's to each bent. Eleven bents are equipped with ice breakers.

Roadway is two 13-foot lanes separated in the center by two 12 x 12-inch timbers bolted side by side to the 4 x 12-inch decking. Similar guard rails were 12 x 12's, bolted on each outside roadway edge. A railed walk way for pedestrian traffic is three feet wide on each edge and uses 2-inch decking.

Loading was computed for trucks, trailers, tractors, and 4-cubic-yard draglines with a permissible live load of 30,000 pounds psi.

Quantities and Personnel

Excavation	12,950,400 cu. yds.
Fill	24,022,000 cu. yds.
Concrete	235,900 cu. yds.
Reinforcing steel	10,240,000 pounds
Structural steel	1,510,000 pounds

The Corps of Engineers, U. S. Army, was represented by B. V. Reany, project engineer. Colonel L. J. Lincoln is district engineer, Kansas City District. George Bennett Construction Co. was represented by Boyd Wilson, general superintendent. Tobin-Barcus Construction Co. was represented by W. H. Longmire, general superintendent, who had 60 men on the job, and cement plant erection was under the supervision of R. M. Webber of Tobin-Barcus.

The Speedall Model 15 front-end loader features torque converter drive.

New Front-End Loader With Torque Converter

■ A new 1½-cubic-yard front-end loader is announced by the Pettibone Mulliken Corp., 4700 W. Division St., Chicago 51, Ill. The Speedall Model 15 loader has a torque converter which allows foot accelerator control and eliminates shifting and clutch slipping. The manufacturer points out that the torque converter minimizes the damaging effects of shocks, jars, and jolts on operating mechanisms.

A further advantage is that the engine operates at full power for large loads and with just enough power for light loads because of automatic power selection for the load being handled. The engine cannnot be stalled, thus eliminating slow-downs while waiting for the engine to pick up speed.

The bucket of the front-end loader can be raised to 15 feet 9 inches and has a reach of 3 feet 7 inches at maximum dumping clearance. The unit is available with either gasoline or diesel engine.

For further information write to the company, or use the Request Card at page 18. Circle No. 2.

Field-Cast Roof Panels Made by Vacuum Method

■ A detailed description of plant and job planning for the production of large numbers of identical precast-concrete roof elements on the job is available from Vacuum Concrete, Inc., 4210 Sansom St., Philadelphia 4, Pa. The company's production technique features the use of a vacuum mat to lift the finished panels from the molds.

Successive casting-yard operations described are the release of side forms on previously cast panels, stripping and storing panels, cleaning molds, placing pre-assembled reinforcing cages in the molds, placing approximately 95 cubic yards of concrete, and vibrating, screeding, vacuum processing, and finishing of the concrete. Also described are the curing, removing of spilled concrete, and washing and cleaning of the vacuum mats and other equipment.

The complete story of the project appears in a reprint of an article originally written for the Journal of the American Concrete Institute.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 74.

Poor & Co. Appointment

N. Rulison Knox has been appointed assistant to the chairman of Poor & Co. A subsidiary is Pioneer Engineering Works, Inc., manufacturer of road machinery.

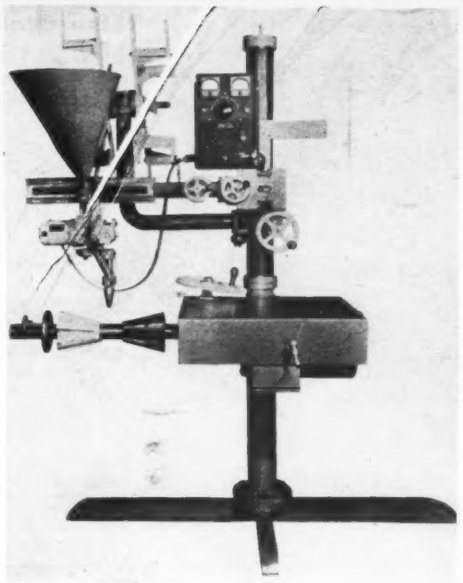
Prior to his appointment, Mr. Knox was vice chairman of Bucyrus-Erie Co., of South Milwaukee. He was president and director of the same company from 1943 to 1952.

Hand-Gun For Cleaning Uses Sand, Liquid, Air

■ A hand-gun for cleaning small parts and surfaces with sand, liquid, or air is made by C. A. Roesch & Co., 1221 S. Hope St., Los Angeles 15, Calif. The Carco gun operates on air pressures from 75 pounds and up. Maximum efficiency for sand blasting is at 100 to 140 pounds.

The gun has a light metal body with a precision-built valve and trigger assembly and a hardened-steel jet and nozzle. A kit available contains the gun, three extra nozzles, an extra steel jet, a glass sand container with cap, machined brass fittings, a 3-foot rubber hose, and a wrench for removing and installing the jet.

For further information write to the company, or use the Request Card at page 18. Circle No. 91.



The Mir-O-Col K-2 welding machine.

Choosing Wire Rope

■ A guide to selecting wire rope is available from the Bergen Wire Rope Co., Lodi, N. J. The literature emphasizes that the diverse conditions under which wire rope operates demand careful study of many physical characteristics before the proper selection can be made.

Choosing the proper wire rope depends on the quality of material, the size and arrangement of wires in each strand, the number of strands, the composition of the core, and the method of laying strands around it. The booklet covers each of these considerations in some detail.

A feature of the booklet is the listing of the ten commandments for the care of wire rope.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 77.

New Welding Machine

■ A new automatic welding machine for rebuilding wheels, pulleys, track rollers, idlers, and cones is announced by the Mir-O-Col Alloy Co., 312 N. Avenue 21, Los Angeles 31, Calif. Designed to handle work of any size up to 40 inches in diameter, the Mir-O-Col K-2 welds 30 inches of bead per minute. The machine handles any shape of work and takes all types and sizes of wire up to ¼ inches.

Features of this model include an adjusting wheel which permits fine vertical adjustments of 1/64-inch, a lock on centers that prevents slippage and makes for a concentric build-up, and a gear reducer on the motor that gives variable spindle speeds from ¼ to 3 rpm. Utilizing the submerged arc principle of automatic welding, the K-2 has an automatic welding positioner and simplified panel control.

A twin-head model of the unit can handle two jobs of different diameters at the same time. Separate rack and pinion assemblies make it possible to rebuild a 40-inch idler and a 24-inch roller simultaneously, with only one operator needed.

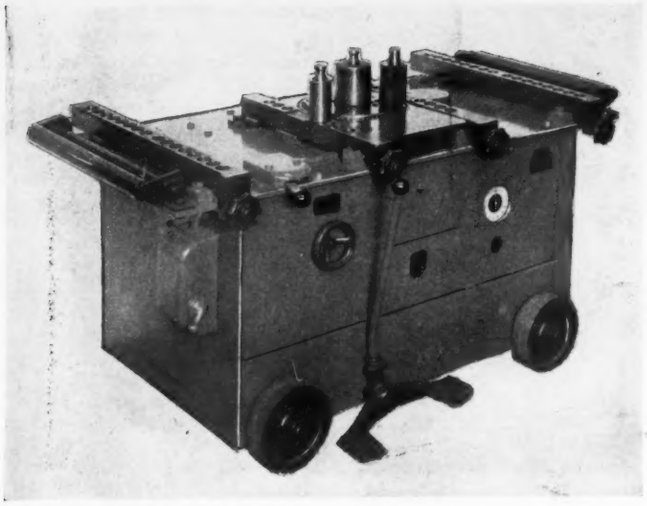
For further information write to the company, or use the Request Card at page 18. Circle No. 134.

Catalog on Hose Couplers

■ A line of hose couplers is shown in literature from Snap-Tite, Inc., 201 Titusville Road, Union City, Pa. The couplers will handle air, water, gas, oil, and most chemicals. They are furnished in brass, aluminum, stainless steel, and in special alloy steels. The couplers are equipped with Buna packer for temperatures of 0 to 270 degrees F. Special packers that withstand up to 400 degrees F are also available.

The literature covers valve-type and plain-type couplers and nipples. Specifications given include sizes, dimensions, lengths, unit weights, and standard pressures. The couplers shown range from ⅛ to 3 inches.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 43.



The Klingelhofer Perfect bar bender.

Bar Bending Machine

■ A new automatic bar-bending machine that can make right and left hand bends by means of a single control lever is available from the Klingelhofer Machine Tool Co., Industrial Park, Kenilworth, N. J. The unit has a variable-speed drive that is adjustable to suit any thickness of material, so that the machine operates efficiently even when handling light stock. An automatic stop and return control makes for safety and uniform work.

The Perfect bar bender is fully enclosed to protect parts from dirt, and the machine is mounted on heavy casters.

Two supporting rails with holes to take the resistor pins are on the right and left sides of the bending plate. The four rails are adjusted by hand wheels on the operating side. Different diameter rods can be quickly handled and always held parallel to the table during the bending operation.

Adjustments for hook and angle bends are made by a hand-lever found between the two left supporting rails. Attachments for the bar-bending machine include double-bending equipment for bending of hooks and angles on slab, truss, or off-set bars. A second attachment for bending and straightening spirals and rings can be left permanently on the machine. The stock can be worked from the reel. Equipment for bending stirrups and other shapes of light stock is also available.

The bar-bending machine is made in three models to handle rounds from ¼ to 2 inches in diameter.

For further information write to the company, or use the Request Card at page 18. Circle No. 73.

Booklet on Crane Scales

■ Typical applications of crane scales and indicating or recording instruments for weighing loads electronically are described in literature from Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. The bulletin shows how the scales are installed and used.

The Baldwin SR-4 crane scale is a device for weighing objects while they are being lifted by a crane. The scale consists of three units: the pickups, connecting cable and reel, and the remote weight-indicating instrument. The pickup supplies an electric signal which is proportional to the weight of the object lifted, and the instrument translates this electric signal into a direct reading in pounds or tons.

The literature illustrates details of the separate parts with engineering drawings.

To obtain this literature write to the company requesting Bulletin 4105, or use the Request Card at page 18. Circle No. 135.

Data on Hydraulic Tubing

■ A new bulletin on seamless hydraulic tubing is available from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.

The booklet lists industrial standards for such tubing and a table of sizes and calculated bursting pressures of steel hydraulic tubing available for shipment from stock.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 136.

The Meyer Field Rangefinder.

Range Finder Measures Inaccessible Objects

■ A hand instrument for measuring distances is made by Meyer-Opticraft, Inc., 39 W. 60th St., New York 23, N. Y. The Meyer Field Rangefinder is a precision device with a 6-inch base length for measuring distances from 8 to 100 feet. The overall accuracy claimed by the manufacturer is two per cent. The instrument is especially useful for measuring inaccessible objects.

The instrument is based on the triangulation principle, using two strongly contrasting images. On sighting through the eyepiece, two images of the object are visible, one white, and one gold. Turning a knob on the instrument in either direction causes the white image to move. When this image is superimposed on the gold image, the range finder is in perfect alignment. The distance from the observer's eye to the object is then indicated on the instrument.

For extensive overhead work, the range finder may be equipped with an erecting prism assembly.

For further information write to the company, or use the Request Card at page 18. Circle No. 79.

Steam Cleaner Line

■ A new catalog describes and illustrates all six sizes of the Malsbary steam cleaner line. The booklet explains the differences between the company's fireless, steam vapor, and high-pressure combination models.

Charts of pressures, capacities, temperatures, and volumes help the buyer compare the various units to determine what size and type of cleaner best fits his work.

The catalog also lists standard accessories, including 4-foot swivel steam-gun, cold water gun, and hoses.

To obtain this literature write to the Malsbary Mfg. Co., 845 92nd Ave., Oakland 3, Calif., or use the Request Card at page 18. Circle No. 137.

New Type Weight Ball

■ A new type of weight ball for use on long-boom cranes is announced by Atlas Rigging & Supply Co., 462 Forest St., Kearny, N. J. The ball consists of two parts: a cast iron sphere with a slot cast vertically through the center, and a cast steel open-wedge socket that fits into the ball. When assembled, the hoisting wire passes through the center of the ball through the socket and then back through the slot ending a few inches above the top of the ball. The socket, which fits into a seat cast in the bottom of the ball, is also sold as an independent unit.

The ball is available in sizes from 25 to 400 pounds for wire from ⅜ to 1 inch. Balls for ⅜ to ½-inch and ⅞ to 1-inch wire are made with interchangeable sockets.

The manufacturer points out that the Howe overhaul ball offers a number of advantages. The open clevis extending from the base is adaptable to any lifting attachment, and the design of the ball occupies less space, saving headroom in tight corners. The open wedge socket bears the load directly, so that it uses the maximum strength of the hoisting rope. The spherical top surface eliminates possible sheave breakage on contact on high lifts.

For further information write to the company, or use the Request Card at page 18. Circle No. 50.

Plastic Covered Plywood

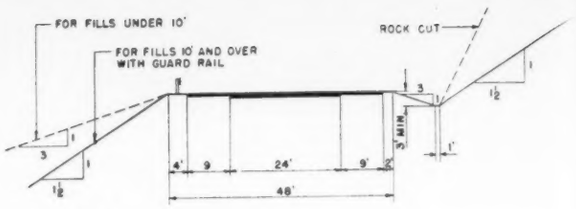
■ Plastic-surfaced plywood is described in a booklet from the Walton Plywood Co., 644 E. 38th St., Indianapolis, Ind. The board has a base panel of exterior-type Douglas fir plywood and a plastic overlay of either a resin-impregnated fiber sheet or a mixture of resin and wood fiber.

Three types are offered. One has smooth, durable surfaces that make a superior paint surface. The second has hard, tough abrasion-resistant surfaces and is usually used without a finish. The third is an overlay of resin and wood fiber, hot-pressed to only one side of the panel.

The booklet recommends the panels for concrete forming where smooth surfaces are desired. The boards are said to strip easily and to give long service in re-use.

A section of the booklet gives suggestions on how to saw, nail, screw, drill, and paint the plastic-covered panels.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 111.



A typical two-lane section.

THE CROW THAT FLIES along the West Virginia Turnpike route now under construction is going to need an extra compass in his tail because this new mountain superhighway, running through rugged country for 88 miles with less than six miles deviation, is straighter than the proverbial crow's flight.

Unlike most highway construction, which starts at one end and drives to the other, the $96,000,000 West Virginia Turnpike, from Charleston, in the north, to Princeton, near the Virginia border, is being built all at once with more than 25 contracts underway. Grading, drainage, bridges, almost 75 substructures, and a $5,000,000 tunnel, 2,665 feet long and 33 feet wide, are being whipped into shape as crews labor in two and three shifts.

Aside from the urgent need for this expressway, part of the rush to complete it stems from a desire to save interest on the borrowed $96,000,000 by opening the road to paying traffic as soon as possible.

West Virginia's turnpike gives the rugged mountain region a high-speed road that would have been difficult to build with regular state revenues. This area, which has had a transportation problem since Colonial times, is avoided as much as possible. Driving around it is preferable to fighting 9 per cent grades, tight 50-foot-radius curves, and short sight-distances on narrow roads that flood in summer and become icy in winter. And while West Virginia's Allegheny Mountains may not be the highest in the country, motorists find they are among the steepest.

Most modern toll roads parallel

West Virginia builds new 88-mi oll

Bates & Rogers has contract for ½ mile tun through rock; to be lined with 25-inch concr

A drill crew works in the crown of the Standard Tunnel on the West Virginia Turnpike. The Ingersoll-Rand DA-25 drifter on the I-R boom is mounted on top of the 3-deck jumbo.

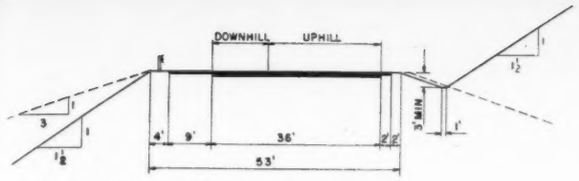
THE $5,000,000 Standard Tunnel, 2,665 feet long, between Paint Creek and Cabin Creek valleys in West Virginia, is probably the factor controlling the early completion of the $96,000,000 West Virginia Turnpike.

The contractor has 470 days from January 1, 1953, to complete the job. There was some delay at first while the West Virginia Turnpike Commission was deciding whether to make the turnpike two or four lanes wide. Work is carried on 24 hours a day, six days a week, and the tunnel is expected to open in early summer, 1954.

Bates & Rogers Construction Corp., Chicago, Ill., is the contractor on tunnel excavation, reinforced-concrete lining, tunnel drainage facilities, concrete roadway, electrical wiring and equipment, concrete retaining walls at portals, and open-cut excavation at the south portal. Ventilation and service buildings, ventilation fans, electrical installations, and other work will be done under separate contracts.

Standard is the only tunnel on the 88-mile turnpike. It is located 19 miles south of Charleston, where it pierces the high steep ridge between Cabin Creek and Paint Creek valleys. The south portal is located a half mile west of the town of Standard and in the vicinity of Four Mile Fork; the north portal is east of Fairfield, near Giles Creek. The tunnel is a semi-circular arch with straight side walls. Its 24-foot roadway has a raised sidewalk with a handrail on one side. Ventilation

Speeding out of the West Virginia Turnpike tunnel, this Tournarocker is on its way to the dump.



A typical three-lane section for steep grades.

modern highways, already overburdened with traffic, and offer safety as their main advantage by eliminating left-hand turns and cross traffic and by reducing congestion. With this toll pike, an almost virgin territory will be opened to the vacation traveler, the business motorists, and particularly the freight truckers —for here, railroad competition is lacking. While engineering estimates as to potential traffic have been conservative, a heavy traffic demand might indicate the need for widening the road to a four-lane expressway, as had originally been planned.

Although the pike is the same length as Oklahoma's Turner Turnpike, its cost will be double that of the Oklahoma road. Moreover, it will be only half as wide as the Turner Turnpike. This gives some inkling of the construction difficulties involved in building this West Virginia road.

Background

West Virginia has fewer motor vehicles per capita than the national average for the United States, a fact which has added to the difficulty of building modern highways in the state with normal highway funds.

In order to finance highway construction, the West Virginia Turnpike Commission was created by the Legislature in March, 1947, and empowered to issue revenue bonds, build roads, and collect tolls. It first planned a four-lane divided highway, but when engineering studies indicated that the cost would be excessive compared to potential revenues, plans were changed to provide a two-lane highway on a

(Concluded on next page)

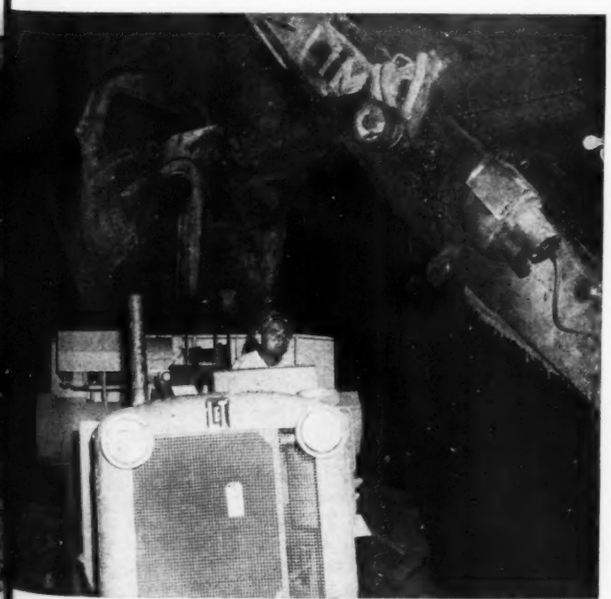
oll highway

By L. H. HOUCK

ducts are above a flat ceiling slab.

The bore, measured from pay lines, is 33 feet wide and 31 feet high, from the centerline of the roadway to the bottom of the arch. The radius of the arch from the spring line to neat line is 16 feet 3⅝ inches, and to the finish line, 14 feet 4⅝ inches. The concrete

(Continued on Page 77)



A 1¾-yard bucket on an 802 Lima Shovel loads a LeTourneau Tournarocker at the 879-foot mark of the tunnel. The rubber-tired units drive at maximum speeds to the heading, turn, back under the dipper reach, then head outside again.

West Virginia Builds A New Toll Highway

(Continued from preceding page)

four-lane right-of-way, allowing for future expansion.

The expressway is designed for safe speeds of 60 mph, except in the tunnel. Grades will be 5 per cent or less, sight distances are exceptionally long, and 9-foot paved shoulders will provide safe turnouts for parking and for disabled vehicles. Creeper lines for trucks will be provided on grades. The southernmost interchange joins U. S. 219 a short distance east of Princeton. The first toll plaza is located near the junction and will accommodate local Prineeton and Bluefield traffic, as well as through traffic from U .S. 219.

There will be an interchange at Chelyan in the north, where the expressway parallels the south bank of the Kanawha River, to serve U. S. 60 and State 61. Two interchanges at Charleston will permit traffic to flow swiftly east and west, and to the city and the airport. Other interchanges will be located at Beckley, Mossy, and Kanawha City.

Traffic lanes will be 12 feet wide, with paved shoulders built 9 feet out from the highway. All embankments more than 10 feet high will have modern guardrails, curvature will be limited to a minimum radius of about 1,000 feet, and the pavement will be superelevated for safe maximum speed.

Structures

Only one vehicular tunnel is required—a testimonial to the expert selection of route—and it is near Standard. Located 19 miles south of Charleston, the tunnel pierces a mountain between Cabin Creek and Paint Creek valleys. It is 33 feet wide and a half mile long.

There are three large bridges on the road. One will cross the Kanawha River and another, the Bluestone River, with the latter span built more than 250 feet above Bluestone Gorge. The third bridge is more than 250 feet above the stream bed of Four Mile Fork of Paint Creek and spans a deep valley to connect with the south portal of Standard Tunnel. All bridges have 30-foot roadways between curbs, and safety walks on each side.

There are more than 70 other turnpike structures, including underpasses, overpasses, and stream crossings, but only 25,000,000 tons of steel will be required for the job.

Coverdale & Colpitts, consulting engineers of New York, N. Y., made the traffic and revenue studies. Howard, Needles, Tammen & Bergendoff, Kansas City, Mo., and New York City, made engineering studies to determine the feasibility of the project and were later employed as general consultants and supervisors of construction.

In order to keep the general plan of building the turnpike as a single unit, sectional engineers were employed and assigned as follows: Section 1 (south), Capitol Engineering Corp., Dillsburg, Pa.; Section 2 (central), Fay, Spofford & Thorndike, Boston, Mass.; Section 3 (north), Gannett, Fleming, Corddry & Carpenter, Harrisburg, Pa.; Standard Tunnel, Singstad & Baillie, designers, New York City.

Paving

Alternate bids will be received on the paving—asphaltic concrete and portland-cement concrete—9 to 10 inches thick, with loading designed for heavy trucks, on a 14-inch crushed-rock subbase.

Quantities and Personnel

The following are some of the important totals:

Excavation and borrow	21,400,000 cu. yds.
Subgrade material	958,000 cu. yds.
Pavement	1,332,000 sq. yds.

Suggested toll charge for passenger cars for the full length of the turnpike is $1.55.

Ray Cavendish is executive director of the West Virginia Turnpike Commission, which is composed of D. H. Morton, chairman; William G. Stathers, vice chairman; and Edward J. Flaccus, Hugh F. Hutchinson, and H. K. Griffith. Headquarters are at 1340 Wilson St., Charleston, W. Va.

Cooper Union Centennial

The Cooper Union Foundation Building, the oldest building in the United States supported by rolled structural beams, celebrated the 100th anniversary of the laying of its cornerstone last month. A stainless steel commemorative plaque was presented to Cooper Union by the American Institute of Steel Construction, Inc., at informal ceremonies celebrating the school's centennial. The presentation was made by John E. Jackson, president of the AISC.

Located at Fourth Ave. and Eighth St. in New York City, the building was constructed at a cost of $650,000. It was the forerunner of today's modern skyscraper and the first semi-fireproof structure in the city.

Founded by Peter Cooper, steelmaster, inventor, and philanthropist, the building's utilization of Mr. Cooper's rolled beams caused considerable comment in the construction field at the time it was started. When beams earmarked for the new structure were sought for purchase, Mr. Cooper sold them and used the profits to build a finer structure than had been originally planned. The foundation building was completed in 1859 at a cost of more than double the original estimate.

The building boasts this country's first ventilated auditorium, with air being driven up through the floor by a steam-driven fan, and a circular elevator shaft, built in anticipation of the day when elevators would transport people from floor to floor.

Half-Mile W. Va. Tunnel Lined With Concrete

(*Continued from page 75*)

lining is 25 inches thick.

Permanent steel ribs of 8-inch WF steel, with 31-pound posts and 35-pound arches, are set on 2-foot centers for the first 32 feet, 4-foot centers for 400 feet, and then continued on 6-foot centers. It was originally planned to stop use of steel ribs 400 feet from each portal, but the formation has not been suitable for roof bolts or for elimination of supports, as had been anticipated. Roof bolts may be used only in the center 600 feet, and when this point is reached it may be decided to continue through with steel ribs.

The ribs are not figured as bearing mass weight because the formation is stable and hard, but they provide an effective umbrella against rock that falls during construction. No amount of scaling can insure fully against this hazard, since blasting splits the formation off into fine slabs and makes roof bolting procedures difficult.

At the south portal, the bore has a 3.25 per cent up-grade. Roadway elevation at the south portal is 1,022.9 above sea level, and north portal elevation is 1,108.4.

The Jumbo

The three-deck jumbo used on the job has stairs with guard rails and mounts 13 Ingersoll-Rand DA-35 drifters on I-R booms. There are 19 I-R drifters on hand, as well as an SA-90 stoper, three I-R FM-2 wagon drills, and four I-R pumps.

The jumbo, laid out to allow the

(*Continued on next page*)

After being hauled 2,000 feet from the tunnel face, muck is dumped down the mountainside by the Tournarocker unit.

Half-Mile W. Va. Tunnel Lined With Concrete

(Continued from preceding page)

maximum number of men and drills to work at the face, is mounted on four crawler tracks instead of conventional flanged wheels and rails. While this is not the first instance of such use, it is comparatively new in tunneling, where it eliminates track laying and track jumping.

The compressed-air plant consists of five 535-foot Gardner-Denver compressors, connected to 150-hp Westinghouse electric motors, which supply air at a compressor pressure of 125 psi. I-R Jackbits are used, ranging from 1⅞ to 2⅜ inches. The blacksmith shop is equipped with an I-R pedestal grinder, a size 40 steel sharpener, and an electric Jackbit grinder.

The consistently high pull of each round held close to estimates. Two representative patterns show drilling and shooting details: Round No. 90, fired at 3 a. m., June 8, 1953, at the south portal, had 134 14-foot holes and 17 plugs, a total of 1,944 linear feet. Holes were loaded with 1,325 pounds of 1¼-inch 40 per cent gelatin dynamite (Red Diamond and Atlas were used) and knocked off with Hercules 0-to-10 delay detonators. The breakout science was to shoot the center out with instantaneous caps, with the early delays breaking out the sides. Lifters and the crown were capped with 8, 9, and 10's each way from the center. This round pulled 12 feet, totaling 483 cubic yards.

Round No. 70, with 106 10-foot holes, was fired May 22 and pulled 6 feet, totaling 345 cubic yards on 925 pounds of dynamite. Average pull per foot was 34.8 cubic yards. The powder ratio was consistently running 2.7 pounds per cubic yard.

An 8-foot hole was drilled in the roof at each round to explore the formation, which had a tendency to break and splinter since the strata descended against the ascent incline of the bore.

The driving sequence as spread over the 24-hour shift follows:

Drill, Load Shoot	Clear Air and Muck	Erect Steel
5:15	5:45	4:00
6:45	6:00	2:00
7:30	7:40	13:30
5:35	6:45	13:00

An average of about 30 minutes was required to clear the air after shooting.

Muck Hauling

Crawler and rubber-tired equipment, instead of rail and electric machines, was used to haul muck. Positive ventilation, plus high speed movement of Tournarockers, which hauled the muck about 2,000 feet, made fast diesel equipment practical.

A Model 802 Lima shovel with a 19-foot dipper stick, loaded muck with its 1¾-yard bucket into five Tournarockers. Three were Model E-9's, and two were E-18's; all were powered with General Motors Series 71 diesels.

E. V. Jones, left, is resident engineer for Howard, Needles, Tammen & Bergendoff of New York City. At right is M. C. Warmbier, project manager for Bates & Rogers Construction Corp., Chicago.

Because these vehicles could make turns on a 12-foot radius, they could drive up to the heading, going between split jumbo sections, make a turn, back up under dipper reach, and then speed to the outside. An ordinary truck could not turn in the 33-foot tunnel without backing.

Other diesel equipment included a Caterpillar D8 dozer which helped clean up the muck. A Hough Payloader assisted at loading, and was also used to handle the 20-foot sections of 26-inch Naylor rigid piping with Wedge-lock couples, which carried ventilating air to within 100 feet of the face. The pipe was hung along the side and about 15 feet from the bottom of the tunnel.

Ventilation System

A 200-hp motor-driven Ingersoll-Rand blower, with a reversible four-way valve, was located outside the tunnel entrance, and supplied 21,000 cubic feet of air per minute. After shooting, the fan was reversed to draw out contaminated air, while the 6-inch compressed-air line valve near the face was cracked to force smoke out of the pockets and into the air intake.

Air was checked continuously throughout each shift for explosive gas and periodically for silica content. Silica content was kept below 5,000,000 particles per cubic foot and minimum oxygen content was 14 per cent. Carbon monoxide content, always so important when internal-combustion engines are operated in confined places, was held below 0.01 per cent. The main source of silica, the muck pile, was held within the limit by careful hosing, especially at the shovel bucket. Ventilation and wet drilling kept the silica content low during the drilling operations.

Concrete arch and wall lining will not be started until more is completed.

Air ducts occupy a space 14 feet 3 inches wide and 9 feet 3 inches high above the suspended ceiling. Fresh and exhaust air ducts are separated by a 3-inch granite partition. The ceiling slab has a 3-inch slope from center to curb lines. It is 14 feet 2½ inches above the roadway level, with the outside of the slab cast integral with the wall lining, and the center rib suspended from steel hangers that are bolted to the top of the arch.

The top surface of the ceiling is damp-proofed with one coat of primer and two coats of hot asphalt. Expansion joints are raised slightly to form roof-drip catch basins, which are connected to side drains.

Roadway

The roadway consists of a 10-inch reinforced-concrete slab with a ¾-inch crown and a ⅜-inch, premolded, longitudinal expansion-joint along each curb line. Transverse expansion-joints are spaced on 37-foot 9-inch centers, with 1 x 18-inch round slip dowels on 12-inch centers, and a ⅜-inch premolded filler in the slot.

Center-line marking will be a permanent double line of white ceramic brick separated by 6 inches of concrete. It will be made with 4 x 8-inch glazed brick, set in two slots. Before the bricks are pressed into place, the slots will be treated with a prime coat of cutback asphalt. They will then be filled with a ¾-inch cushion of mastic. This cushion is made with 93 to 97 per cent dry sand and 7 to 3 per cent cutback asphalt, mixed in a pugmill and placed at a minimum temperature of 60 degrees.

Water could be a problem in this section of the Allegheny Mountains, where free-flowing veins are rather common. The drainage system is designed to take care of almost any contingency. If there is any water from the crown, it is caught by the ceiling and funneled to 3-inch asbestos drain pipes, which are placed on 39-foot centers on each side of the tunnel, and then taken to the continuous roadway gutter. Sheet steel fresh-air flues extend from the fresh-air duct above the ceiling and through the west wall to roadway level. They have elbows at top and bottom. Exhaust air is sucked through ports in the east half of the ceiling.

Subgrade and wall water are drained into a 12-inch reinforced-concrete pipe. This pipe is laid in a concrete cradle that rests in a longitudinal trench 3 feet 6 inches wide and 5 feet deep and is located 10 feet from the east curb. A 4-inch, cast-iron, bell and spigot, cement-lined water line is laid in the same trench. The 12-inch pipe connects with roadway manholes and catch basins located on 435-foot centers. Eight and 6-inch perforated concrete pipe is connected to manholes to supplement subgrade drainage.

Quantities and Personnel

Quantities include:

Tunnel excavation	91,800 cu. yds.
Open cut excavation	25,000 cu. yds.
Embankment	5,800 cu. yds.
Concrete tunnel lining	20,800 cu. yds.
Concrete road slab	2,000 cu. yds.
RC retaining walls	675 cu. yds.
Permanent steel ribs	2,400,000 lbs.
Steel ref. bars and fabric	980,000 lbs.
Misc. structural steel	167,000 lbs.

Ray Cavendish is executive director for the West Virginia Turnpike Commission. C. H. Peterson, project engineer for Howard, Needles, Tammen & Bergendoff, supervisors of construction, has charge of the 88-mile project, and E. V. Jones is resident engineer for Standard Tunnel and Four Mile Fork Bridge. Tunnel designers are Singstad & Baillie. Bates & Rogers Construction Corp. is represented by M. C. Warmbier, project manager; L. A. Cunningham, engineer; and J. C. Fore, tunnel superintendent.

Lessmann Names Ockford

Robert E. Ockford has been appointed an eastern representative for Lessman Mfg. Co., Des Moines, Iowa. Mr. Ockford's territory covers most of northeastern United States. He will call on dealers and assist in the promotion of the company's hydraulic power-crowd loader.

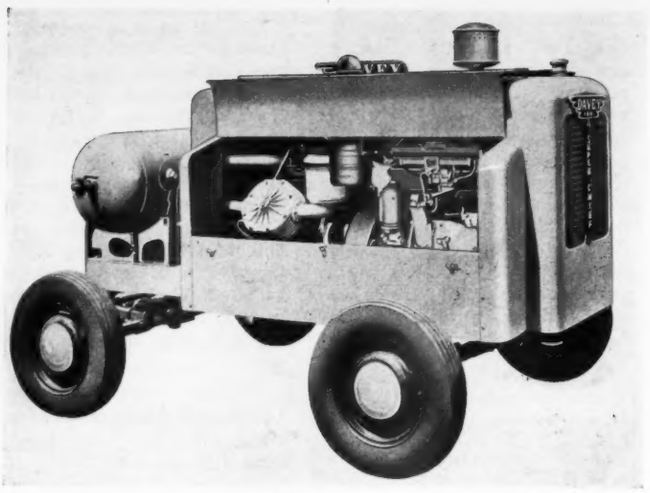
"The day's past when a supe' can keep his office in his hat, but he just won't admit it."

Portable Compressors

■ A new, portable, 160-cfm compressor is announced by the Davey Compressor Co., N. Water St., Kent, Ohio. Called the Super Chief 160, it is available in 2 and 4-wheel trailer models and on skid mountings. It is said to be 200 to 1,000 pounds lighter than other compressors of the same capacity.

The unit has two low-pressure cylinders with 6-inch bore and 3¾-inch stroke, and one high-pressure cylinder with a 5¼-inch bore and 3¾-inch stroke. It is offered in both gasoline and diesel-powered models.

Standard features include automatic compressor-engine controls, individually-finned cylinders, and force-feed lubrication. Other construction details are cast-aluminum crankcases, multi-port valves, electric starting, and automotive-type steering.



The Davey Super Chief 160 compressor.

For further information write to the company, or use the Request Card at page 18. Circle No. 107.

Booklet on Bucket Loaders

■ Bucket loaders made by the N. P. Nelson Iron Works, Inc., 820 Bloomfield Ave., Clifton, N. J., are shown in literature from the company. The Nelson Series 11 line includes two loaders, the wheel-mounted model P-11 and the crawler-mounted model Q-11. Both will handle any loose material up to 3 inches cube from stock piles or bank-run sand and gravel pits at a rated loading capacity of 3 to 4 cubic yards per minute.

A mechanical feature of the loaders is the hydraulic boom-hoist which has dual cylinders and can be lowered to horizontal position without disconnecting the drive chains.

The P-11 is mounted on pneumatic tires and has a road speed of five miles per hour. A manually engaged, self-releasing differential stabilizer that prevents wheel-spinning is available. The Q-11 is mounted on 9-inch, self-cleaning crawler tracks with 6-foot 9-inch centers. Twelve-inch-wide tracks are optional. This model travels at 3 miles per hour.

Literature describing these units may be obtained from the company, or use the Request Card at page 18. Circle No. 138.

New Plant for Universal

Universal Concrete Pipe Co., Columbus, Ohio, is building its first west coast plant at 5555 Irwindale Ave., Azusa, Calif. Manufacturing equipment, shipped from Ohio, is being installed in the new plant, which will produce concrete pipe and other concrete products.

Henry A. Weigand has been named plant manager, and Chris Adzovich has been made production manager.

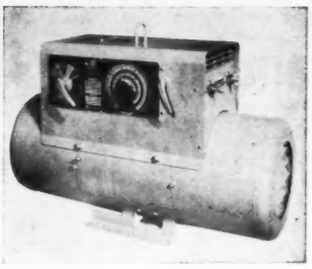
Steam Pile-Driver Hose

■ A new wire-reinforced hose for steam pile drivers has been announced by the Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Tacony and Comly Sts., Philadelphia 24, Pa.

Three layers of horizontally braided high-tensile steel wire and a layer of glass cord braid reinforce the Ironsides pile-driver hose.

The tube is made of a synthetic rubber compound that resists temperatures up to 388 degrees F. It also resists oil at pile-driver service pressures. The hose is covered with a thick abrasion, heat, and oil-resistant layer of rubber bonded to the reinforcing braids. Sizes available are 1½, 2, and 2½ inches.

For further information write to the company, or use the Request Card at page 18. Circle No. 41.



New Welder Controls

■ The 200, 300, and 400-ampere dc generator welders made by Metal & Thermit Corp., 100 E. 42nd St., New York 17, N. Y., now have improved controls. There is a new welding current control by means of an electrode size-selector and a large dial for minor current adjustments. The electrode selector is set to the size of the electrode to be used and the calibrated current dial is turned to the heat desired. A reversing switch provides a change of polarity.

The magnetic motor starter is operated by push button control and has two automatic-reset thermal-overload relays which protect against severe and continuous overloads and low line voltage.

For further information write to the company, or use the Request Card at page 18. Circle No. 141.

Devenco Sales Manager

John T. Gillespie, Jr., has been appointed sales manager of the newly organized Swingfire Division of Devenco, Inc., 150 Broadway, New York 38, N. Y., manufacturer and distributor of the Swingfog insecticide applicator.

Mr. Gillespie was graduated from Yale in 1926 and was a sales consultant before joining Devenco. He served in the Division of Contract Distribution, U. S. Maritime Commission during World War II and later became special scheduling officer of the Shipbuilding Division of the War Production Board.

Labs on Wheels Developed by Army

Truck and semitrailer-mounted laboratories, capable of traversing rough terrain to bring maintenance apparatus to U. S. Army units operating in forward areas, will be made available to Army engineers in the field if the equipment passes qualification tests.

These items were developed by the Engineer Research and Development Laboratories, Fort Belvoir, Va., and are now undergoing engineering service tests. Among them are a materials laboratory, a cleaning and preservation unit, a photomapping train for topographic organizations, and five maintenance shops.

The mobile materials laboratory will support the construction of airfields, taking up to 60,000-pound wheel loads. It contains equipment necessary to run tests on soils, asphalt, and concrete and can be used to determine capabilities of existing fields.

Spur Gear Hoists

■ A total of 55 different models and sizes of spur gear hoists have been added to the line made by Coffing Hoist Co., 800 Water St., Danville, Ill. Included among the new units are 15 sizes of single and multiple-chain spur gear hoists with capacities of from ¼ to 25 tons. For specialized applications there are ¼ to 10-ton plain and geared Army-type hoists, 1½ to 24-ton low headroom hoists, ¼ to 10-ton Clevis-connected hoists, and ¼ to 3-ton extended hand-wheel hoists.

In the Army and low headroom models, the hoist is an integral part of the trolley. The trolley may be plain or geared. Clevis-connected hoists are used where low headroom prevents the standard hoist and trolley hookup. By removing the top hook and suspending the hoist from a special trolley clevis, 3 to 16 inches of headroom are saved.

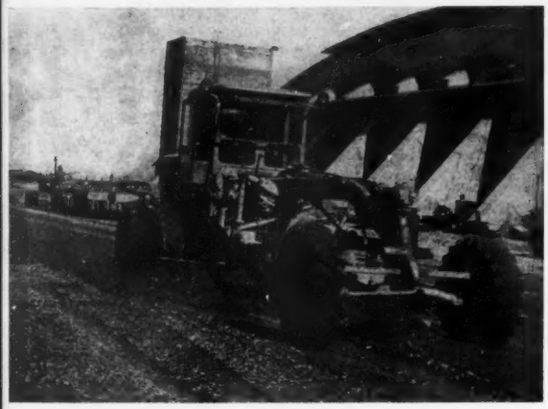
Extended hand-wheel hoists are desirable for handling hot materials and large bulky loads. On this type, the hand-wheel is extended to a maximum of 10 feet, allowing the operator to stand at a distance from the load at all times.

For further information write to the company, or use the Request Card at page 18. Circle No. 28.

Reich Is Hyster Manager

Hyster Co., Portland, Oreg., manufacturer of materials-handling equipment and tractor tools, has named John Reich factory manager of its Danville, Ill., plant.

Mr. Reich, formerly assistant factory manager for the company's plant in Peoria, Ill., has been with Hyster since 1946 as factory engineer, general assembly foreman, and supervisor of tool design.



A Caterpillar No. 12 motor grader blade-mixes and levels aggregate subbase material while pneumatic rollers work in the background. *Ray Day Photo*

Thick granular base for Alaskan Airfield

Permanently frozen ground has to be excavated for big parking apron at Eielson AFB, Fairbanks

NEAR FAIRBANKS, ALASKA, in the land of the northern lights, one of the world's big-plane parking aprons has been under construction at Eielson Air Force Base. Making the job difficult were the huge chunks of permanently frozen ground, called permafrost, which are under the airfield site. Ground water level is within 5 feet of the normal ground surface. Lines of supply to get machinery and materials to the location are long and difficult. And yet, because of strategic reasons, some of the heaviest plane loads devised must be handled here.

This is the situation which the Anchorage, Alaska, District Office of the U. S. Army Corps of Engineers faced as, with contractor help, it pushed work on the big parking apron toward completion. Work started in August, 1952, and altogether, the project called for something like 300,000 square yards of plane parking area. This gives Eielson one of the biggest plane-parking facilities on a military base.

No Easy Design

Because of the permafrost condition underneath the airfield, the design of an adequate subbase to handle heavy wheel-loads was not an easy task. Working with permafrost is tricky. In frost-susceptible materials, such as glacial silt, permafrost is dynamite. It moves practically anything placed upon it. Not only do all frost-susceptible materials have to be removed and replaced with granular material not vulnerable to freezing, but such things as utilities lines have to be

A pair of Tampo pneumatic rollers compacts the subbase material near one of the new hangers at Eielson Field, Fairbanks. *Ray Day Photo*

The subbase is given a final rolling by this Huber 3-wheel, 12-ton tandem machine. Later, a final check of the surface is made with a straight-edge. *Ray Day Photo*

placed in reinforced-concrete utilities tunnels instead of being buried in the ground. All these factors add to the cost of a job.

The big Eielson aprons consist of one main parking slab, 4,000 feet long and 420 feet wide. There is also a 1,000-foot x 420-foot slab, and two miscellaneous areas adjacent to a plane hangar, all of which call for lighter pavement together with some light-duty paving around a fire house.

The heavy-duty paving area in the larger parking apron calls for high-quality construction totaling 53 inches in thickness at average depth. However, because of two bad sloughs which had deposited geological glacial silt through the apron site many years ago, frost-susceptible material sometimes had to be removed to such depths that as much as 11 feet of subbase construction had to be replaced. In these cases, frost-susceptible material was removed down to the glacial gravel which underlies the site. The extra excavation was then replaced with granular material, brought in from nearby pits, and compacted to a density of 95 per cent of Modified AASHO.

General specifications for the heavy-duty paving section call for 95 per cent density in the first 25 inches of granular material above the natural subgrade line. This is followed by 30 inches of graded gravel, 3-inch minus in size, which is laid in 5-inch lifts and rolled to 100 per cent Modified AASHO density. On top of this material, 6 inches of special crushed base-course rock, in two 3-inch compacted lifts, is specified. Specifications for this blanket also call for 100 per cent density and for a minimum of 50 per cent fractured faces on the rock particles.

(*Continued on next page*)

Steam for the hot plant is furnished by this Cleaver-Brooks steam generator, here being set up and adjusted by the contractor's crew. *Ray Day Photo*

Thick Granular Base For Alaskan Airfields

(Continued from preceding page)

After being dressed to a tolerance of ¼ inch in 10 feet, this special base course calls for 0.25 gallon of MC-0 oil per square yard as a prime.

Pavement consists of 2½ inches of asphaltic concrete binder course, a light spray application of RC-0 asphalt, and 1½ inches of asphaltic concrete wearing surface. The asphaltic concrete is made with 120 to 150 penetration asphaltic cement. Marshall density specifications on the hot stuff are 1,000. CBR's in the subbase material are close to the 80 rating which was obtained in the laboratory.

The light-duty paving sections in the contract call for 3 inches of asphaltic concrete, 6 inches of the same base-course material compacted to 100 per cent density, and 15 inches of granular subbase. The upper 9 inches of subbase material is to be compacted to 100 per cent, while the lower 6 inches is to be compacted to 95 per cent. Paving around the fire station is considerably lighter. It calls for 2 inches of asphaltic concrete, 6 inches of pit-run gravel compacted to 100 per cent, and 6 inches of pit-run material compacted to 95 per cent.

Excavation Starts it Off

When field men of the Corps of Engineers moved in with the contractor's crews, the parking area was a low, gently rolling expanse of ground, covered with arctic willows and other small brush. The first major job was stripping and excavation.

After the brush was burned, a fleet of earth-moving equipment came in. It consisted of 12 Euclids split between single-power scrapers, 13-yard bottom dumps, and end-dump machines. Three loading draglines were split between two Northwests and one Lima, from 1½ to 1¾-yard capacity. These machines were assigned to loading work.

The average haul to waste disposal areas, which had been designated under the specifications, was about 1,500 feet. Insofar as possible, material in a thawed condition was dug, although the permafrost showed up within 3 feet of normal ground surface in many spots. When these locations were found, machines moved to another part of the excavation area, leaving the frozen formation exposed to the sun's rays. It usually required three to four days exposure to melt about 12 inches; then the machines moved back in to take that much more of the material away. Thawing also produced ground water, requiring pumps to be used.

The two deep sloughs were made up of silty permafrost, a combination unsuited for any type of foundation. These areas were dug out, often to depths of 11 feet, before the clean glacial gravel was found. This gravel is not susceptible to permafrost and shows no tendency to become heavy or to distort when it is frozen solid.

Another interesting phase of excavation concerned the installation of a number of transformer vaults for the lighting and electrical control system. In many cases, these vaults, built of reinforced concrete, had to be sunk below the normal water table. In practically 100 per cent of these cases, permafrost showed up long before excavation had been finished. For days, a small ¾-yard Lima dragline went from one loca-

tion to the other, skimming off about 12 inches of permafrost whenever it could, leaving the remainder for the sun to thaw.

When the transformer locations had been finally mucked out, the crews built two sets of reinforced-concrete prefabbed slabs large enough to enclose a transformer vault. With these walls in place, they were wrapped in asphalt-impregnated paper to make the structure as watertight as possible. The prefabbed panels did an excellent job of holding the excavated walls from sloughing as sunshine thawed the banks. Water running in from below was pumped out, usually by Chrysler-driven Jaeger 6-inch pumps, and conventional plywood and 2 x 4-backed forms were set in place for the concrete pours.

Concrete was delivered by Dumpcretes which hauled the material from a central plant location on the base. Concrete placing was followed by conventional methods.

Careful Work on Subbase

Eielson Field has a plentiful supply of granular-base material, deposited in huge pockets throughout the area. It consists of a well-graded formation, 3-inch minus in size, and deficient only in the No. 20 to No. 40 size gradation. Corps of Engineers specifications can be met simply by wasting some of the material from the coarse end of the scale.

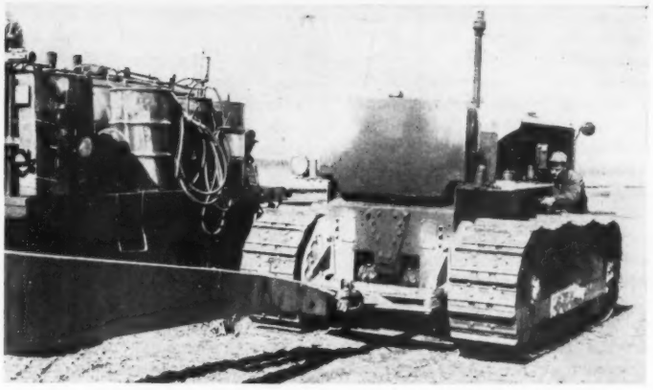
A sizable pit site was laid out about 15,000 feet from the center of the work, and gravel production over a 20-acre site had opened up a sizable lake by midsummer. Draglines, digging 14 to 16 feet deep, brought out the material and loaded it to the same fleet of Euclids which had been used in the initial excavation work. In cases where the pit run material met specifications directly, it was hauled to the field. But it was usually passed through vibrating screens to insure its meeting specifications.

A central rock plant, set up for the production of acceptable material, consisted of a Caterpillar D8 dozer feed, a Pioneer plate feeder, a Caterpillar D17000-driven Pioneer roll-crusher, a Symons 4-foot cone-crusher which was driven by a Caterpillar engine, a set of Symons vibrating screens, and an Eagle sand washer. The entire plant is used in the production of mineral filler for the asphaltic concrete, while portions of the plant were used infrequently for subbase work.

The size of a subbase work area worked at one time was generally determined by the size and amount of electrical duct banks in a given area. Areas 300 feet square were sometimes worked, while areas more than twice as large were worked at other times. An area was built up without depressions by laying the lifts of material uniformly over one area. After the material was dumped, it did not require blade mixing, since dragline loading against the 14 to 16-foot face provided an adequate mix. Several Caterpillar No. 12 motor graders were sent in to level the material; then the compaction process began.

Compaction equipment included a special 75-ton pneumatic roller,

(Concluded on next page)



A Caterpillar tractor on the Alaskan job is lubricated by Graco Convoy Luber. Regular servicing is essential for equipment working in this area. *Ray Day Photo*

Thick Granular Base For Alaskan Airfields

(*Continued from preceding page*)

built especially for the Corps of Engineers, and used by the contractor. There was also a dual set of Tampo 15-ton wobble-wheel rubber-tired rollers, and in some cases—though this was a temporary measure—loaded Euclid trucks were used, especially in narrow and confined areas.

Field men soon found that best densities were developed by giving the material considerably more moisture than its optimum content of about 5 per cent. Water was easy to get, because any sump dug a few feet below the natural water table soon produced enough moisture to keep two 4,000-gallon trucks hauling it. The water was sprinkled heavily on the material during and prior to the rolling process. Lifts were built up in 5-inch increments. An exception was the special 6-inch subbase topping, which was laid down in two 3-inch lifts. The top of this material, after being finished off to the required 100 per cent density, was carefully blue-topped on 25 x 50-foot centers. A contract laborer, working closely with the No. 12 motor grader operator, helped the operator trim to close tolerance with a 16-foot special blade.

After a final rolling by a Huber 3-wheel 12-ton tandem machine, the surface was checked by a 16-foot straightedge. If any deviations greater than ¼ inch in any 10 feet of the board were found, the area was reprocessed, rerolled, and rechecked until it was smooth.

Thousands of square yards of the heavy base, carefully examined by Corps of Engineers men, showed no deflection or sponginess whatever, even under the action of the rubber-tired 75-ton roller.

Hot Plant Set Up

A Barber-Greene continuous-mix hot plant is set up at the rock processing plant for paving operations. The plant is a stock model machine without alterations. An average 15,000-foot dead haul is necessary for hot-mix trucks.

A feature of the hot-mix work is the fact that asphalt for the job is being transported from San Francisco to Fairbanks. Standard Oil Co. of California is supplying the 120-150 penetration asphaltic cement from its Richmond, Calif., refinery. The asphalt is loaded in special 3,000-gallon transit tanks, which freeze solid on the long ocean voyage from San Francisco to Seward. At Seward, the 12-ton tanks are transferred by crane to the Alaska Railroad, then shipped to Fairbanks where they can be trucked out to the job.

The thawing operation on the tanks is done by a Cleaver-Brooks bituminous booster, which heats the material and sends it through a 4-inch pipeline to the plant storage tanks. Mineral aggregate is stocked in three piles, where it is handy for a Lima clam. This machine loads it to the plant for a 4-bin separation, breaking on the No. 4 screen.

The laydown job is handled by a Barber-Greene finisher, which places the first base-course material to a compacted thickness of 2 inches. A 1½-inch wearing or surface course tops out the paving, after the base course has been primed with a light shot of RC-0 asphalt.

Completion of the big plane parking area, through the efforts of these men, gives Eielson AFB a much greater operational flexibility and makes it an even more powerful defensive arm of the Alaskan Air Command.

Personnel

Corps of Engineers operations at Eielson are under the general supervision of Colonel L. H. Foote, district engineer. F. A. Norton and H. R. Harrington are supervising civilian field engineering and inspection of the work.

Pneumatic Tire Rollers Have Wide-Face Tires

■ New wide-faced tires are available for the pneumatic-tire rollers made by the Wm. Bros Boiler & Mfg. Co., 1057 Tenth St., S. E., Minneapolis 14, Minn. New literature from the company states that the tires give increased compaction coverage on every pass and eliminate any shifting of voids and low spots and the building up of ridges and lines.

Another feature stressed is an improved king-pin design on the rollers which permits towing tongues to float freely, with the bolsters mounted on a conventional-type fifth wheel. Drawbar hookups can be made quickly at any height.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 105 .

Power Takeoff Drives Of Flexible Shafting

■ Flexible shafting power takeoff drives for dump trailers are made by the Stow Mfg. Co., 445 Shear St., Binghamton, N. Y. Advantages of this type of drive are that it eliminates expensive and delicate power couplers and provides quiet, vibrationless operation.

The drive unit consists of a 1¼-inch shaft with a square telescopic bar and tube. The telescopic rod takes care of the change in length when the tractor-trailer is jackknifed and also serves as a quick-disconnect coupling. A universal joint is used between the pump and telescopic rod so that the flexible shaft will not be bent too severely. The mechanism is supplied complete, except for the universal joint.

By using extension bars of different lengths at the power takeoff end, a fleet operator may use flexible shafts of the same length for his entire fleet so that a few shafts may be stocked for quick replacement.

If powered fifth wheels are already in use, short flexible shafts may be used to connect from the power takeoff shaft to a universal joint at the powered fifth wheel. This eliminates several universal joints and the sprocket drive.

For further information write to the company, or use the Request Card at page 18. Circle No. 71.

Pettibone Wood Formed

Pettibone Mulliken Corp., Chicago, Ill., has acquired the assets of Wood Mfg. Co., North Hollywood, Calif., and has formed a new company, Pettibone Wood Mfg. Co., a wholly-owned subsidiary. The new company will continue operations at the same location with the same personnel.

Wood manufactures Roadmixers and Preparizers, which will now be added to the Pettibone line of motor graders, front-end loaders, conveyors, pumps, and other equipment. W. C. Wood is vice president.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Prime Contractor Was Not Liable Under Safety Code

THE PROBLEM: *A New Jersey safety code required one "in charge" of construction to take certain precautions against injury to workmen. A prime contractor for construction of tower work sublet the work. A structural-iron worker employed by a subcontractor was fatally injured through falling from the tower. If the statute was violated through failure to furnish the worker with a safety belt and life line, and if the prime contractor did not participate in the subcontractor's violation of the code, could the prime contractor be held liable under the statute?*

THE ANSWER: No. (Trecartin v. Mahony-Troast Construction Co., 87 Atl. 2d 349, decided by the New Jersey Superior Court, Appellate Division.)

The court said that the case fell within the general rule that, where a prime contractor exercises only such supervision as is needed to see that subcontractor perform his subcontract, it is up to the latter, not the former, to safeguard the subcontractor's workmen. The subcontractor reserved to the prime contractor no control over the subcontractor's equipment or employees. The court cited decisions that had been rendered to the same effect by the appellate courts of Indiana, Illinois, Oklahoma, and Oregon.

However, the New Jersey court ordered a new trial on the ground that the trial judge had erred in intimating to the jury that the prime contractor might be held liable through mere failure to provide the safety appliances. In ordering the new trial, the court noted that there was evidence from which the jury could find that the contractor actually interfered with the furnishing of the appliances and thus participated in the subcontractor's neglect. A decision of the New York Court of Appeals was cited on the point that a general contractor may be held liable in such cases as having negligently contributed to the injury of a sub's employee under such circumstances.

Furthermore, there was a clause in the prime contract requiring the contractor to maintain necessary safeguards, and a clause in the subcontract making the conditions of the prime contract binding between the contractors. The court decided, in the prime contractor's favor, that this clause did not create liability against the prime contractor.

Government Loses A Novel Tax Claim

THE PROBLEM: *A Federal statute (40 U. S. C.A., Sec. 270a) requires Federal prime contractors to furnish bond to pay labor claims. A subcontractor withheld part of his employees' wages under the Federal income tax and unemployment insurance statues, but did not pay the withheld funds to the Government. Did the Government have a right on the prime contractor's bond?*

THE ANSWER: No. (United States Fidelity & Guaranty Co. v. United States, 201 Fed. 2d 118; U. S. Court of Appeals, Tenth Circuit. United States v. Zschach Construction Co., 110 Fed. Supp. 551; U. S. District Court, Eastern District of Oklahoma.)

In the first case, the subcontractor had assigned to his surety as indemity funds to be received from the prime contractor. The Court of Appeals decided that the surety's claim to the funds was superior to the Government's claim for taxes withheld from the wages of the subcontractor's employees, but not paid over; and that the priority referred back to the date of the suretyship contract.

In the second case, the District Court allowed judgment against the subcontractor for the amount of withheld funds not paid over, but exonerated the prime contractor and his surety on the ground that their obligation to discharge liability for wages did not cover the subcontractor's obligation to withhold as tax payments by the employees part of the wages withheld.

Resident Engineer— Power to Contract

THE PROBLEM: *A pipeline company let terminal facilities construction to prime contractor but stockpiled materials furnished by it. Unloading of the material was first done by special contractors, but the resident engineer later hired a dragline and a clamshell bucket from the plaintiff, signing rental contracts as the company's representative. He had not been authorized to make such agreements and had not previously attempted to do so. Was the company liable to the plaintiff for the agreed rentals?*

THE ANSWER: No. (T. S. McShane

(Continued on next page)

Avoid Legal Pitfalls

(Continued from preceding page)

Co. v. Great Lakes Pipe Line Co., 57 N. W. 2d 778, Nebraska Supreme Court.)

The court recognized that a representative may be found to have been implicitly authorized to perform certain acts, even though there was no explicit authority. Power may be inferred from approval of previous acts of the same nature, or by custom in the particular trade or industry. But this resident engineer was merely superintendent of construction, charged with checking the work against plans and specifications, reporting progress to the owner's home office, making contracts for extra work by the contractors when authorized by his superiors, and so forth. There was no proof that resident engineers in similar situations were customarily recognized as being empowered to rent equipment. Custom or usage in a trade may indicate authority in an agent only when it is well settled and uniformly acted upon.

Premature Garnishment

THE PROBLEM: *A statute permitted garnishment of funds only if they were "due absolutely and without any contingency". (It is so provided in many states.) A contractor had become entitled to an installment payment by a town for work done, but the architect had not issued the certificate of approval that was prerequisite to payment under the contract. Was attempted garnishment of the installment effectual?*

THE ANSWER: No. (Abbot Lumber & Building Supply Co. v. Cushing Construction Co., 112 N. E. 2d 245, decided by the Massachusetts Supreme Judicial Court.)

Call For Bids Was Properly Signed

THE PROBLEM: *A township commissioner of highways, not the township, was legally authorized to advertise for and receive bids for furnishing gravel. The advertisement was signed in the name of the township, "By William Sleaford, Commissioner," etc. Did that invalidate the bidding and entitle the low bidder to recall its bid and to a return of a check deposited as security for entry into a contract?*

THE ANSWER: No. (Western Sand & Gravel Co. v. Town of Cornwall, 111 N. E. 2d 861, decided by the Appellate Court of Illinois, Second District.)

The court noted that the negotiations contemplated a contract with the commissioner and not the township, as provided by law. It was immaterial that the proceeds of the forfeited check went into a township fund, as the law required.

Computation of Excavation Yardage

THE PROBLEM: *A paving contractor agreed to pay subcontractors for excavation and clearing based upon the state engineer's estimates, as such estimates were received by the paving company. The company was paid on the basis of a semifinal estimate covering 28 months, and that estimate was larger than the total of the monthly estimates. Was the subcontractor entitled to be paid on the same basis?*

THE ANSWER: Yes. (Municipal Paving Co. v. Farmer, 255 S. W. 2d 618, decided by the Kentucky Court of Appeals.)

The court noted that the semifinal estimate was larger than the total monthly estimates, because a cross-section calculation had been made in making the former. The court also thought that because the prime contractor was paid on the more favorable basis, it was only fair that the subcontractor be paid on that basis.

And, because the combined monthly and semifinal estimates did not correctly show the yardage of dirt removed, the court decided that it was proper to accept the figures of the highway engineer, his qualifications being unquestioned and he being familiar with the project.

State Was Bound By Its Contract

THE PROBLEM: *A state highway department agreed to pay for gravel taken from plaintiffs' lands for road construction, and funds were available for payment. Was suit to collect the price dismissible on the ground that the state was immune from suit?*

THE ANSWER: No. (State Highway Department v. Dawson, 1953, 253 Pac. 2d 593. Colorado Supreme Court.)

The Court said: "Ordinary business honesty insists that a state, or any of its departments or agents, cannot be allowed to receive the benefits from an agreement and then repudiate the transaction without restoration of the property taken, or its agreed price, or the reasonable value thereof."

Truck Owner Was Not an "Employee"

THE PROBLEM: *A subcontractor for haulage of prepared asphalt to highway job sites, not having sufficient trucks, hired local truck owners who were paid on a per ton basis and fully controlled and repaired their trucks. An owner was injured when his truck turned over. Was he entitled to a workmen's compensation award under Arkansas law, on a theory that he was an "employee" of the subcontractor?*

THE ANSWER: No. (Massey v.

Trucking Co., 254 S. W. 2d 959. Arkansas Supreme Court.)

In deciding that the truck owner was an independent contractor, the court referred to an earlier and similar case where it had decided that a truck owner was no less an independent contractor because the contractor who had engaged him loaded the truck and directed the place for dumping.

Third Party Debts

THE PROBLEM: *Under statutes in most, if not all, states a promise to pay a third person's debt is not binding unless in writing. If labor and materials were furnished by C to a subcontractor on the prime contractor's oral promise to pay for them, was the promise enforceable?*

THE ANSWER: Yes. (Curtis Manufacturing & Asbestos Co. v. W. D. Bates Construction Co., 1953, 94 Atl. 2d 550.) Decided by the New Hampshire Supreme Court.

The court applied the well settled rule that by inducing another to furnish materials or services to a third person on the faith of a promise to pay for them, the promissor becomes the original debtor and not a mere guarantor, and so does not promise to pay a debt of the third person.

Specialty Licenses

THE PROBLEM: *A contracting company was licensed as a general contractor. A specialty license was also required by state regulations to permit it to engage in specialty construction. If the company did not specify that it desired to bid for, or had any opportunity to bid for, or had attempted to bid for, specialty construction, was it entitled to a court decree determining its right to engage in specialty construction without a specialty license?*

THE ANSWER: No. (Charles L. Harney, Inc. v. Contractors' State License Board, 238 Pac. 2d 637, decided by the California District Court of Appeal, First District, Division 2.)

The specialty construction for which special license was required, in addition to a general license, included public work.

Haulage As Lienable Item

THE PROBLEM: *Under the Kansas mechanics' lien law where materials were sold for delivery on a construction site, was the materialman's cost of haulage a lineable item?*

THE ANSWER: Yes. (Thomasson v. Kirkpatrick, 254 Pac. 2d 329. Kansas Supreme Court.)

Wisconsin Acquires Plant

Wisconsin Motor Corp., Milwaukee, Wis., has purchased a plant formerly occupied by Sterling Motor Truck Co., Milwaukee, whose operations have been moved by the owner, White Motor Co.

In addition to providing facilities for increased production, the plant will house several expanded departments of the company. Wisconsin Motor Corp. manufactures heavy-duty air-cooled engines which are used by manufacturers of field equipment for construction, materials handling, pit and quarry, and other work.

Service for Small Motors

■ A new bulletin on small motors is announced by General Electric Co., Schenectady 5, N. Y. The booklet describes the new G-E service for fractional and integral-hp motors and generators.

The literature explains the types of service provided, service warranties, motors covered by the plan, and the fhp motor factory repair service. Authorized service stations are listed.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 27.

Device Removes Tires

■ A one-man pneumatic tire-demounter is announced by the Autocar Co., Ardmore, Pa. The machine consists of an eight-armed spider mounted on a suspension frame and operated with a 12-inch-diameter, 12-inch-stroke Bellows 90-pound-pressure air cylinder.

The wheel and tire, with locking ring up, are placed on a platform dolly which is rolled into position. The spider, mounted on a cross piece, is lowered by compressed air against the tire. The eight arms of the spider press in toward the center of the wheel and force the tire down so that the locking ring is pried loose.

The tire is turned over and rolled under the spider arm again, and when the spider arm is forced down, it knocks the tire clear of the rim all the way around.

For further information write to the company, or use the Request Card at page 18. Circle No. 34.

ASTM Pamphlet on Soils

The American Society for Testing Materials has published five papers under the title "Symposium on Exchange Phenomena in Soils". Emphasis is placed on the influence of dynamic molecular and ionic exchange upon properties and responses of soils, thus leading to methods by which soils are altered to achieve adequate engineering performance even under adverse circumstances. The purpose of the symposium is to encourage interest and work in this field, which can lead to improved soil mechanics testing and analysis and better design and construction practices.

The $1.75 pamphlet may be obtained by writing to the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

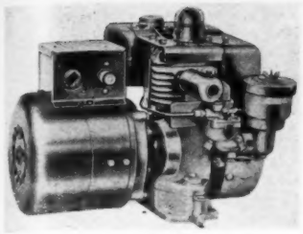
A 1953 supplement to the book of ASTM standards will be published later this year, containing 63 new specifications and tests that have been approved.

Drafting Machines Shown

■ A new booklet that illustrates drafting machines is available from the Charles Bruning Co., Inc., 4700 Montrose Ave., Chicago 41, Ill. Models shown include gravity-compensated, track-type, civil engineering, and detail machines.

The Bruning drafter combines the functions of a T-square, straightedge, triangle, protractor, and scales into one precision machine.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 70.



The new, smaller, 500-watt electric plant made by Universal Motor Co.

New Electric Plant

■ A revised Model 550 electric plant is announced by the Universal Motor Co., 498 Universal Drive, Oshkosh, Wis. It is 5 pounds lighter, 2½ inches shorter, and 6 inches lower than earlier versions and contains a new driving unit. It develops the same 500 to 550 watts ac, 110 to 120 volts, as former models.

The plant is recommended for use on construction projects, for standby service, for lighting, and for powering tools in remote areas. Its total weight is 73 pounds.

The unit employs a 1-cylinder, 4-cycle model engine, available with either manual or electric starting. There is a convenient plug-in receptacle on the generator.

For further information write to the company, or use the Request Card at page 18. Circle No. 103.

International Harvester Makes Appointments

I. P. Payne has been appointed manager of industrial power sales for the Melrose Park, Ill., Industrial Power Division of International Harvester Co., Chicago, Ill. C. E. Jones and W. M. Holland have been named assistant managers of sales; L. J. Lange, general supervisor of sales development; and E. A. Braker, general supervisor of sales engineering. W. W. Black has been made general supervisor of service and parts merchandising.

In a series of other appointments, three regional sales managers have been named to represent the company. H. E. Broadwell is western regional sales manager; L. A. Commer, central regional sales head; and E. L. Boughton, manager of eastern regional sales. All will be located in the company's Industrial Power Division plant.

Tractor-Drawn Scraper

■ A new tractor-drawn scraper with a capacity of 19 cubic yards heaped and 15.2 cubic yards struck is announced by the Wooldridge Mfg. Co., Sunnyvale, Calif.

Featuring a new open-bowl design, the scraper has an extremely low center of gravity for stabilized balance in all positions. A 25-inch ground clearance offers increased maneuverability. Unrestricted discharge of sticky materials is made possible by a 75-inch-wide apron opening.

Other features include a roll-out ejector, large low-pressure tires for maximum flotation, and a new, wide pusher plate. The manufacturer also stresses the unit's accessibility for lubrication and service.

For further information write to the company, or use the Request Card at page 18. Circle No. 123.

Sales Representative for Baldwin-Lima-Hamilton

Jack Watson, formerly sales manager with the Trailer Division, Pressed Steel Car Co., Chicago, Ill., has joined the construction Equipment Division, Baldwin-Lima-Hamilton Corp., Lima, Ohio. As sales representative, he will work in northern Illinois and the lower peninsula of Michigan, selling Lima shovels, cranes, and draglines.

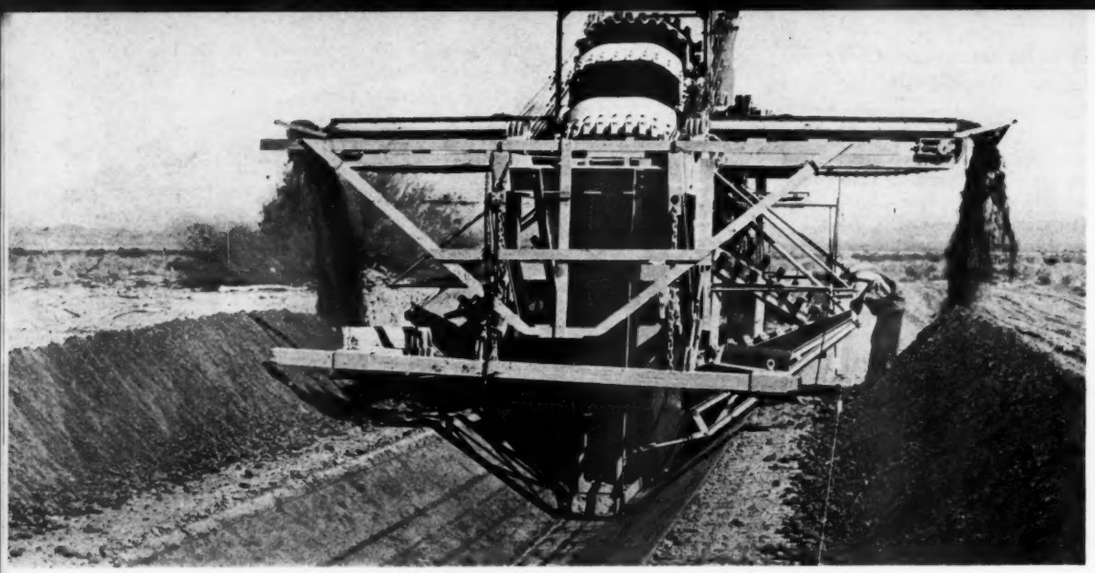
New Concrete Form Tie

■ A snap tie for concrete forms is announced by the Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago 51, Ill.

Features of the Strip-Easy snap tie are: hot forged ends for strength and safety; a special washer that provides additional bearings on the forms and keeps grout seepage to a minimum; wood cones for positive break-backs and for tie removal before stripping forms; and wide flattened sections that prevent turning in concrete.

The company will send a free sample tie and literature upon request.

For further information write to the company, or use the Request Card at page 18. Circle No. 21.



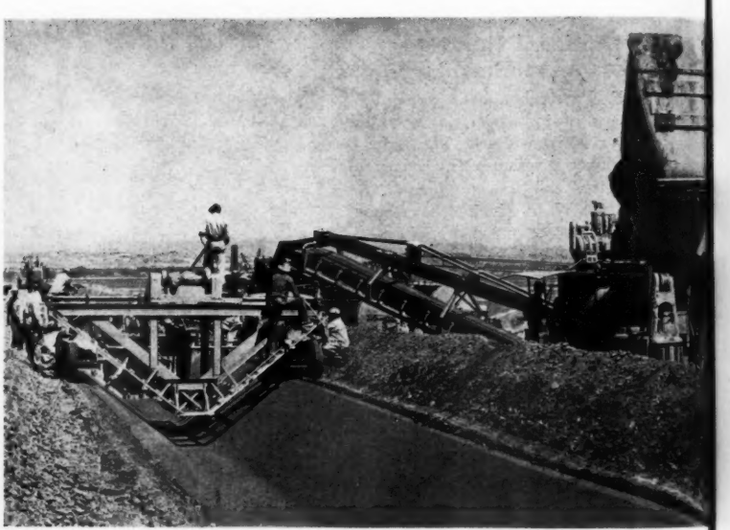
A special Buckeye machine does excavation and trimming work on the Gila project irrigation canal in Arizona.

Men and special equipment excavate and line irrigation canal in fast time

20-mile canal job completed in two months

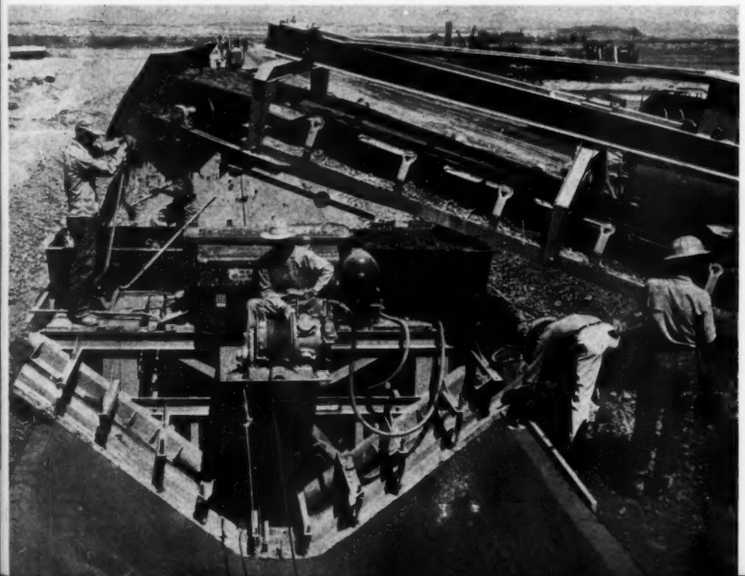
USBR Photos

A front view of the canal excavating machine, which consists of a crawler-mounted ditcher and trimmer, driven by a Caterpillar D13000 diesel engine.

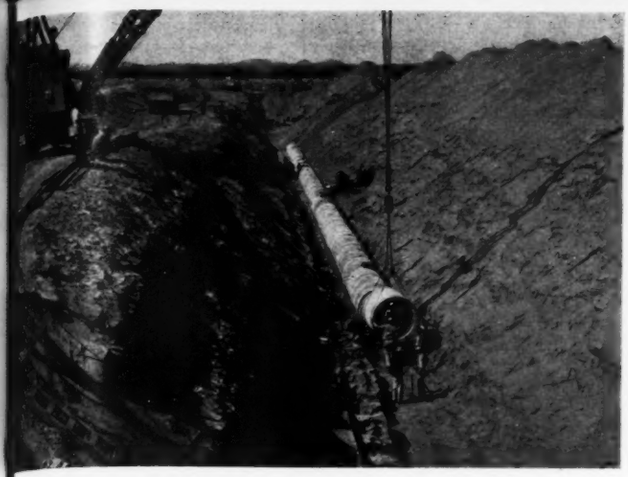


At right a Koehring 34-E Twinbatch paver mixes concrete which passes on a belt conveyor to the new slip form lining machine.

Close-up of the lining machine as concrete slides off the belt conveyor and into the hopper. The machine moves down the center line pulling the special steel slip form.



Working just behind the lining crew, workmen spray Sealtex white pigment curing membrane on the fresh concrete.



A section of concrete siphon pipe is placed at the Gila River crossing. Stang wellpoints are at work.

In fact, many of the huge 48-foot bottom canals which M-K has done in the west have not had problems more difficult than some that had to be solved on the Wellton job. For example, plans for the small bottom canal called for a 3-foot finished berm at the top of earthwork. From a practical standpoint, the mechanical finish of a 3-foot berm is next to impossible. Other contractors finishing previous sections used a large labor force in some of this bank-dressing operation. M-K, however, tried a new mechanization scheme to solve this headache.

The installation of 1,300 feet of 54-inch siphon pipe under the Gila River was not without its problems, too. And the excavation of a small canal to tolerances fine enough to take 2-inch lining without a lot of non-pay concrete being placed in under-cut areas was not easy.

Heavy Earthwork Starts it Off

Of the 20.4 miles in the contract, less than a mile of canal was located in natural grade near its start. The remainder had to be located in built-up dike sections, dense embankments shaped and built by earth-moving equipment. About 334,000 cubic yards of dirt work was called for in this phase of the job.

The construction of embankment for irrigation canals of this size involved short haul work from borrow pits arranged near the various dike locations. Soon after the job was awarded, M-K moved in rapidly with a fleet of 14 Caterpillar D8's, part of which was assigned as pushers and dozers. Hauling units consisted of five 18-cubic-yard Wooldridge scrapers and one Caterpillar No. 80 scraper. Several 3,000-4,000-

(*Continued on next page*)

IN TWO MONTH'S actual working time, and under none too favorable weather conditions, a vital segment of the irrigation canal in Arizona's Gila Project has been readied for service. With the completion of 20.4 miles of excavation and lining, new lands in the area are ready to be pressed into use by the expanding economy of the great southwest.

This speedy lining job, done by Morrison-Knudsen Co., Inc., under a $1,300,000 U. S. Bureau of Reclamation contract, was supervised through the Yuma, Ariz., office of the Bureau of Reclamation. Requirements called for the construction of 20.4 miles of canal in the upper Wellton district of the Wellton-Mohawk Division. The canal is located in Antelope Valley, about 30 miles east of Yuma, in bleak desert lands now blossoming with verdure. The M-K contract called for the preparation of canal embankment, canal excavation and lining, and the construction of about 150 structures typical of irrigation work, including checks, drops, siphons, wasteways, turnouts, and gates.

It was the amazing speed of canal excavation and lining work which made the over-all project move rapidly. Nearly a year from the starting date, November 17, 1952, was allowed by the contract, but the high-speed demonstration of excavation and lining helped to move M-K into a position to bid on other parts of the system which came up months before completion time of the present contract.

Small Canals All

The project, situated at the extreme delivery end of the Wellton-Mohawk system, called entirely for small canals. Approximately three miles in the system called for a canal with a 5-foot bottom width and 1¼ to 1 side slopes, lined with plain concrete 2½ inches thick. The remainder of the job called for a 2-foot bottom width, with a 2-inch concrete lining. Carrying capacities ranged from 15 to 45 cfs. Ditch depths ranged from 1.75 to 4.50 feet.

The system passed through sandy soil that was generally heavy in silt and fine particles.

In spite of the small size of the canal, it gave the contractors trouble.

Gila Canal Section Finished in Two Months

(Continued from preceding page)

gallon Euclid water tank trucks were also brought in to help with moisture blending. A 16-inch-diameter and 100-foot-deep well was dug near several borrow pits and equipped with a Caterpillar-driven deep well pump. With the aid of quick-coupling Naylor pipe, water was pumped to small delivery canals, or in some cases, direct to the borrow pits, and the dry dirt was moistened thoroughly before it was loaded. In other cases, water trucks hauled the material from farm wells or irrigation ditches directly to the locations where Cats and scrapers were building the embankment. Working through the fall and winter months of 1952-53, the scraper fleet shaped up the many miles of embankment, and got it ready for the high-speed lining demonstration which was soon to follow.

To give the trimming and lining equipment something to work on, all embankments were built 0.2 foot full and compacted to a density approximately equal to 95 per cent of the Modified AASHO method. This was done by placing the dirt in 6-inch lifts and passing over it from six to eight times with heavy-ballasted Southwest sheepsfoot rollers.

Special Excavators Handle Canal

Three miles of the job, calling for a 5-foot bottom, were excavated by a machine built originally by Macco Corp., Paramount, Calif., on a previous contract. The rig is a shop-built device, which did satisfactory work in those sections of large-bottom canal formerly done by Macco. The machine cut out the three-mile section with its familiar cone-shaped cutting bucket, dumping the material along both sides of the canal.

The remaining 17.4 miles called for the conception of comparatively new equipment. Project Manager J. E. Ricker, as well as many of the other men on the job, had his own ideas about how a machine should be built to do such a piece of excavation and trimming in one operation. The final details of the rig were worked out in close cooperation with mechanical experts of the Findlay Division of Gar Wood Industries, Inc. The special ditching machine was built in Findlay, Ohio. It consisted basically of a crawler-mounted ditch excavator, driven by a Caterpillar D13000 diesel engine. The main bucket line was a circular wheel carrying 17 digging buckets, 48 inches wide, each capable of bringing out about ⅓ cubic yard of material. Mounted on each side of the main bucket line, but driven independently at a faster rate of speed, were cone-mounted knives consisting of six blades with digging teeth on each blade. These blades excavated the sloping part of the canal prism, and trained the dirt down to the main bucket line, where it was picked up and sent out to the discharge conveyors on either side of the machine.

Dragging immediately back of the sloping knives on each side of the rig were two heavy steel slicing knives, which put a finish on the sides of the canal with a minimum of hand labor. The only hand labor used in trimming the canal was a small force which worked in a few locations where the machine dug down on each side of structures. It generally required from 10 to 15 feet to sock the bucket line in to its full digging depth.

Dirt mucked out by the machine was dropped in a neat pile on either side of the canal. Acting on the basis of long experience in this type of construction, project officials gave the new ditcher about a half-mile start when it first moved into the job. This permited that much ditch to be opened ahead of lining operations. Often, in the past, canal excavation and trimming has been the bottleneck factor in the rapid completion of such water distribution works. The machine soon showed that its ample power, sufficient weight, and dependability made for a consistent performance. Its capacity soon was found to be as predictable as that of the concrete-lining crew. When heavy March windstorms began to hamper the work, Project Manager Ricker gave orders to work the trenching machine just ahead of the lining crew. The order was sound. From that time on, the machine operated less than 200 yards ahead of lining equipment, with the result that a complete, well-integrated canal building schedule was set up and followed. There was no trouble from that point on, and progress was excellent.

It is interesting to note that the new ditcher was designed so well that only routine maintenance and buildup of eroded sections had to be done after the rig finished the 17.4-mile assignment. There have been no major breakdowns, and only the routine replacement of digging teeth, which wore down rapidly in the highly abrasive sand, was necessary.

Slip Form Lining

All canal lining was placed by Morrison-Knudsen Co., with some help from the firm of Marshall, Haas & Royce, Belmont, Calif., which furnished the dry-batched concrete materials from its commercial Noble batch plant nearby. In anticipation of the lining job, M-K had built a machine, which project crews quickly named "The Gimmick", in its South Gate, Calif., yard. It consisted of a pair of crawler mountings, capable of being extended to a centering dimension as high as 25 feet. With a Caterpillar D4600 diesel

for driving power, this machine straddled the canal with a track on each berm, and moved down the center line pulling the special steel slip form which was used in placing the plain concrete lining.

The slip form was a heavy sheet metal outline of the finished canal lining. It was built by The Conveyor Co., Los Angeles, Calif., to M-K's general specifications. Viber PX-70 external-type electric-driven machines were mounted on both sloping wings to give the concrete its initial consolidation as the slip form passed over it.

The dry batches of concrete were based on a mix containing 1-inch minus aggregate, proportioned on the basis of a six-sack batch. About 5 per cent of air, entrained in the mix by the addition of Durair, made the concrete more workable. The air-entraining characteristics of the mix also tended to make the concrete more resistant to alkalis and other ground salts commonly found in the area.

The dry-batched concrete materials were hauled out to the job from the Marshall, Haas & Royce batch plant and dumped to the skip of a Koehring 34-E Twinbatch paver. Mix water was hauled by truck from approved sources of supply as close by as possible. The concrete was mixed and dumped to the receiving hopper of a conveyor system which transported it to the top of the slip form. Once in the slip form hopper, the concrete was quickly distributed over the canal sides and bottom, vibrated as the slip form passed along, then finished.

Dummy contraction joints were cut in by special trowel at 10-foot intervals. In addition to this contraction-expansion provision, a 1-inch piece of sponge rubber was placed at the ends of each major structure in the system and in several other places where expansion was a problem. A short distance behind the lining crew, Sealtex white-pigmented concrete-curing membrane was sprayed on the fresh lining to develop the best possible strength under field conditions.

Following closely behind, a Caterpillar D8 tractor with a dozer blade moved in and began to scoop the dirt up against the top of the freshly-placed concrete. Finishing the top of the berm to neat lines, formerly a hand labor job, was done by several methods. A wing mounted on the top of a bulldozer blade frame was used satisfactorily for several weeks. Some leveling was done by a mule and slip. Still later, after "The Gimmick" had finished its towing job on the concrete lining, two steel-blade drags made from old motor grader moldboards were placed behind "The Gimmick" and pulled down the canal to deliver the perfect dressing. This scheme worked fine, and production mounted after the idea was put into effect.

This hand-labor method for finishing the top of the berm was used until steel-blade drags were developed to complete the job.

Structures

The major portion of reinforced-concrete structures in the Wellton irrigation system was built by Sennes Corp. and Kast Construction Co. on a subcontract basis. Structures were generally small. Nevertheless, they called for tedious and sometimes tricky carpenter layouts because perfect hydraulic properties are built into small USBR structures as well as in larger ones.

Sennes Corp. used a system of conventional prefabbing at a central yard, where power saws, power drills, and other such equipment was located. By building forms on a central layout table and using power equipment wherever possible, the forms were finished out to a higher degree of tolerance and built at a lower cost. Trucked to the field, they were set in place by field carpenter crews.

Structure concrete consisted of a six-sack mix, with 1-inch maximum size aggregates, and air entraining sufficient to produce about 5 per

(Concluded on next page)

Yours for the Asking

An extra set of tear sheets of any CONTRACTORS AND ENGINEERS MONTHLY article you may wish to file for future reference.

Our Reader Service Dept. will send such articles pasted on standard file size sheets if you request it.

Gila Canal Section Finished in Two Months

(*Continued from preceding page*)

cent of entrainment. Structure concrete was handled by truck mixers operating from the central batch plant.

Difficult Siphon Built

One of the toughest structures in the long project was the construction of 1,300 feet of 54-inch-round concrete siphon barrel to carry the water underneath the Gila River bed near one end of the project. Construction of the big siphon called for the excavation of a trench through the river bed to a depth of 20 feet, about 2 feet below the normal water table.

Project officials knew from the start that they could expect ground water trouble, but in an effort to stave off the cost of handling this water, they started the siphon by making an open cut excavation near the south end. About 400 feet of the siphon was installed successfully before infiltrating ground water and sloughing quicksand forced these operations to be curtailed.

The firm of John Stang was then called in, and the installation of approximately 900 feet of header, a Stang vacuum pump, and Stang wellpoints on 5-foot centers followed. The wellpoints were jetted in after the main trench had been partly dug, and were installed on the upstream part of the siphon. This wellpoint system corrected all difficulties without further delay. After the area had been pumped only half a shift, it was dry enough to permit the rest of the excavation to be roughed out.

The siphon trench was mucked out by a dragline, and the material was cast upstream temporarily until it could be used for backfill later. The 54-inch reinforced-concrete pipe in 8-foot joints was furnished by Concrete Conduit Co. of Colton, Calif., and was hauled about 200 miles to the project by truck. Pipe joints were set in place by a crane, the joints mortared, and the pipe allowed to set a few days. After that, it was backfilled by a tractor-mounted bulldozer, using the material which had previously been excavated from the trench.

Good Equipment Upkeep

Equipment upkeep followed the contractor's well-known preventive policy, aimed at keeping each unit in service at as high a production figure as possible with the lowest amount of repair expense. To see that manufacturer's recommendations were followed closely, the company established a central yard close to the job in the town of Wellton, near administrative headquarters. A radio communications network, composed of stationary and mobile transmitting stations, was an integral part of the setup, not only for the equipment maintenance, but for the supervisory or operational work generally. Equipment was serviced as much as possible during the lunch period or at the end of a shift, and Saturdays were often used for minor operating repairs. An ample stock of critical parts was maintained in the job stockroom.

Lincoln mobile lubricating equipment was used to bring maintenance to the field. Blistering winds, high temperatures, and sand combined to make maintenance difficult, but M-K veterans were more than a match for the weather. Much of the early pioneering and layout surveying on the job was done from 4-wheel-drive jeeps, whose tires were deflated to about 20 pounds pressure. This equipment did most of the preliminary transportation until permanent job roads had been established by motor graders. In some cases, fuel was supplied for working tractors and scrapers by being skidded on sleds or hauled in 4-wheel-drive machines.

Completion of this sizable irrigation link within such a short construction time is only one more chapter in the story in which construction men have taken part in the development of the arid southwestern desert during the past few decades. These lands, once an area of desert sagebrush and drought, will now become productive as a result of what construction crews have fashioned. This job exemplifies the dependability of modern equipment and the ingenuity of good construction organizations, and shows how rapidly the small-dimension portions of a major irrigation system can go together after the main units have been constructed.

Personnel

All construction operations for the USBR are under the general supervision of L. N. McClellan, chief engineer, with headquarters in Denver. The job was administered at field level through the Boulder City, Nev., office of the Bureau and through the Yuma, Ariz., suboffice.

Morrison-Knudsen field operations were administered from its Los Angeles office. Field officials included J. E. Ricker, project manager; Bud Snowball and Max Ware, excavation; James McGinnis, general foreman; Neal Spencer, project engineer; Glen Van Landingham, master mechanic; Joe Kindred, concrete lining; William Burns, steel foreman; and Charles G. Kincaid, field engineer.

Nut and Bolt Data Sheet

■ A new data sheet gives complete standard nut and bolt dimensions and thread data. Originally developed by Murphy Diesel Co. for the convenience of their own engineering department, it is now offered without charge to engineers and contractors.

To obtain this literature write to Murphy Diesel Co., 5317 W. Burnham St., Milwaukee 14, Wis., or use the Request Card at page 18. Circle No. 32.

Air-Entraining Admixture

■ Literature on an air-entraining admixture said to reduce waste ratio, bleeding, and segregation of aggregates is available from the Sullivan Co., 212 E. Trigg Ave., Memphis 2, Tenn.

Air-Crete, in either liquid or powder form, can be added to any type of portland cement and comes ready to use. It gives controlled air to concrete in order to form greater plasticity, more slump, less segregation, and a better finish.

One or two ounces of the admixture is used for each keg of portland cement to produce 3 to 6 per cent entrained air. The sand content of the aggregate should be reduced by at least 3 per cent of the total weight per cubic yard.

The product is also made in an early setting type that may be used in the same proportions as the regular type.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 157.

Convention Calendar

October 15-16 Virginia Highway Conference
Virginia Highway Conference, Jackson Memorial Hall, Virginia Military Institute, Lexington, Va. R. P. Ellison, executive assistant, Virginia Department of Highways, 1221 E. Broad St., Richmond, Va.

October 15-17 Meeting of Diesel Operators
Second Diesel Operators' Conference, Student Union, University of Nebraska. Robert A. Ratner, University Extension Division, University of Nebraska, Lincoln, Nebr.

October 19-23 ASCE Annual Convention
New York Annual Convention, American Society of Civil Engineers, Hotel Statler, New York, N. Y. Don P. Reynolds, assistant to secretary, ASCE, 33 W. 39th St., New York City.

October 19-23 National Safety Congress
Forty-first National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill. R. L. Forney, secretary, National Safety Council, 425 N. Michigan Ave., Chicago, Ill.

October 26-28 Lubricating Grease Institute
Meeting, National Lubricating Grease Institute, Edgewater Beach Hotel, Chicago, Ill. Harry F. Bennetts, executive secretary, NLGI, 4638 J. C. Nichols Pkwy., Kansas City, Mo.

October 26-29 Public Works Association
Meeting, American Public Works Association, Roosevelt Hotel and Municipal Auditorium, New Orleans, La. D. F. Herrick, executive director, 1313 E. 60th St., Chicago, Ill.

October 29-30 American Concrete Inst.
Southwest Regional Meeting, American Concrete Institute, Rice Hotel, Houston, Texas. Frank Chappell, program chairman, Burt Bldg., Dallas, Texas.

November 2-4 Diesel and Gas Engine Conference
Fifth Annual Conference, Diesel and Gas Engine Power Plant Operators, Oklahoma A & M College, Stillwater, Okla. Division of Engineering and Industrial Extension, A & M College, Stillwater, Okla.

November 2-4 Traffic Engr. Conference
Sixth Annual Illinois Traffic Engineering Conference, University of Illinois, Urbana, Ill. R. K. Newton, supervisor, Engineering Extension, 713½ S. Wright St., Champaign, Ill.

November 10-13 AASHO Meeting
Thirty-ninth Annual Meeting of American Association of State Highway Officials, William Penn Hotel, Pittsburgh, Pa. Hal H. Hale, executive secretary, 917 National Press Bldg., Washington 4, D. C.

November 19-20 Highway and Surveying Conference
Highway and Surveying Conference, University of Florida, Gainsville, Fla. Thomas L. Brandford, associate professor of civil engineering, University of Florida, Gainsville, Fla.

November 30-December 3 American Institute of Steel Construction
Convention, American Institute of Steel Construction, Boca Raton Hotel, Boca Raton, Fla. L. Abbett Post, executive vice president, 101 Park Ave., New York 17, N. Y.

December 14 Bituminous Concrete Producers
Ninth Annual Convention of Bituminous Concrete Producers Association, Waldorf Astoria Hotel, New York City. Gus Rayner, executive secretary, Box 667, Albany, N. Y.

February 15-19, 1954 National Ready Mixed Concrete Association and National Sand & Gravel Association
Twenty-fourth Annual Convention of NRMCA and the thirty-eighth Annual Convention of National Sand and Gravel Association, Conrad Hilton Hotel, Chicago, Ill. Vincent P. Ahern, executive secretary, 1325 E St., N. W., Washington, D. C.

March 15-19 Assoc. of Corrosion Engineers
1954 Annual Conference and Exhibition, National Association of Corrosion Engineers, Municipal Auditorium, Kansas City, Mo. A. B. Campbell, executive secretary, 1061 M&M Bldg., Houston, Texas.

Harnischfeger Appoints

Frank C. Edwards has been appointed general manager of the P&H Diesel Engine Division of Harnischfeger Corp. in Crystal Lake, Ill. He has been sales manager of P&H's small excavator division since 1949.

Forty-Year-Old Highway Soon To Be Resurfaced

After more than 40 years of service, New Jersey's oldest concrete highway, Route 24 near New Village in Warren County, will be given a new 9-inch concrete surface. The one-mile section of highway will be widened from 18 to 24 feet with the addition of 8-foot bituminous concrete shoulders. The Franklin Contracting Co., Newark, has submitted a low bid of $261,631 for the work.

The first road was built in the section in 1905, but it disintegrated within a year. It was rebuilt twice more, only to disintegrate again. These failures were attributed to the fact that the road was built on a clay base. The concrete slabs, 12, 18, and 24 feet in length, developed longitudinal cracks, which permitted the entrance of surface water that froze in cold weather and buckled the pavement. In solving this problem, the practice of incorporating a center joint in the pavement was developed.

When the road now existing was built, tests showed the concrete had a compressive strength of 4,500 psi. Cores taken from the slabs in 1950 showed the same slabs had a strength of 10,000 psi.

Also involved in the repair job is the removal of an old toll house, which was used when Route 24 was a toll road known as the Morris Turnpike.

HRB Booklets on Concrete And Soil Temperature

Two booklets, one giving the properties of air voids and the service record of concrete pavements, and the other, detailing investigations of freezing and thawing of soils, have been published by the Highway Research Board, National Academy of Sciences, National Research Council.

One of the two papers that make up Booklet 70, "Air-Entrained Concrete", describes a method to determine the characteristics of the entrained air voids in concrete. The second paper discusses the performance record of concrete test roads. Both studies are illustrated.

Bulletin 71, "Soil Temperature and Ground Freezing", contains four papers concerning frost action in soils. The fifth paper discusses research needs relative to frost action in soil.

Bulletin 70 costs 45 cents, and Bulletin 71 costs $1.80. Both can be obtained by writing to the Board at 2101 Constitution Ave., Washington 25, D. C.

Conveying Equipment

■ A new trailer-mounted belt conveyor is announced by the Fairfield Engineering Co., Barnhart St., Marion, Ohio. The Fairfield Builder handles bricks, blocks, tile, mortar, lumber, gypsum, roofing, corrugated metal sheets, and other building materials.

The conveyor is available in two models. The Flare Top, Model 270, has a deep trough and carries materials under 16 inches wide. The Flat Top, Model 271, carries wider material.

By adding one or two 8-foot boom sections, the 24-foot base machine can be converted into a 32 or 40-foot conveyor. The unit can be moved on the job by one man.

Other features of the conveyor are all-steel construction, slip-clutch and brake assembly, lightweight carriage, ratchet-type hand hoist for raising and lowering the boom, and removal base for either gasoline engine or electric motor.

For further information write to the company, or use the Request Card at page 18. Circle No. 144.

Tailgate Cinder-Spreader

■ Literature on a motor-driven tailgate spreader that will fit any standard dump-truck body is available from the Highway Equipment Co., Inc., 616 D. Avenue Northwest, Cedar Rapids, Iowa. The Model DD provides a spread from 4 to 60 feet in width and operates at truck speeds of from one to 35 mph. The unit is shown distributing calcium chloride on a country road and spreading cinders on an icy street. It will also handle sand and rock salt.

Power for the distributor disk comes from a 2-hp Briggs & Stratton engine. The steel motor-pinion shaft is ¾ inch in diameter and the distributor shaft is one inch in diameter. Whipping is eliminated by supporting the distributor shaft on ball bearings.

Other features are a safety guard-rail, convenient location of the gas throttle, and adjustable braces which hold the spreader in the proper horizontal position.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 114.

Cartography Examinations

Examinations for positions with various Federal agencies in Washington, D. C., and vicinity as cartographer, cartographic aide, cartographic technician, and cartographic draftsman have been announced by the U. S. Civil Service Commission. In addition to these posts, several field-service-at-large positions throughout the country may be filled. Salaries for the posts range from $2,750 to $10,800 per year.

No written test will be given, but appropriate education, experience, or a combination of both is required. Applications may be obtained from the Commission's Washington office or a Civil Service regional office, and will be accepted until further notice. Applications must be filed with the U. S. Civil Service Commission, Washington 25, D. C.

Fairfield's new trailer-mounted conveyor.

Flame-Resistant Canvas

■ A booklet on flame-resistant canvas fabrics is available from Philadelphia Textile Finishers, Inc., Department R, Ford and Lafayette Sts., Norristown, Pa. The booklet describes specifications, properties, and applications of a variety of treated canvas fabrics.

The characteristics of each type of canvas finish made by the company are described in detail. Government specifications met in the manufacture of the fabrics are also listed. Qualities put into the fabrics include resistance to water, mildew, flame, and weather.

The literature is illustrated with examples of the use of treated canvas—some in the construction field.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 29.

Inset shows trench lines cut in concrete by Eveready saw at lower left.

Device on Concrete Saw Lowers Cutting Blade

■ A new concrete saw has been announced by the Eveready BrikSaw Co., Department 234, 1509 S. Michigan, Chicago, Ill. The saw features a hydraulic blade control that permits the operator to lower the blade gently into the cut at a controlled rate of speed to lessen the danger of dropping or bouncing the blade against the hard material. With two or three strokes of the hydraulic pump handle, the operator lifts the blade straight out of the cut with no twisting or binding.

A second feature of the saw is that the setting of the saw wheels is designed to prevent binding or tilting of the blade when the saw operates over uneven or broken surfaces.

A dual-blade shaft makes it possible to place the blade at either side for sawing in corners of confined areas. A depth-control lock allows cutting to a predetermined depth, and a friction-type foot brake holds the saw on hills or inclines. The saw is guided from controls on the dashboard.

For further information write to the company, or use the Request Card at page 18. Circle No. 42.

Mastic Floor Surfaces

■ A new booklet describes the advantages of using plastic pellets in an asphalt-rock mixture for industrial flooring. Two types of flooring materials, with the pellets, are described in some detail in the booklet available from the Flash-Stone Co., Inc., 3723 Pulaski Ave., Philadelphia 40, Pa.

In the Immediate-Set-type limestone rock asphalt is factory-crushed in controlled sizes. Live rubber granules are added and the combination is wet-mixed with a quick-setting liquid asphalt emulsion binder. This resurfacer is available in a ready-mix type for patching small areas and in a location-mix type for work on large areas. The ready-mix type, shoveled from the bag in which it comes to the floor and then tamped, is then ready for traffic.

The product is also offered for location-mixing in which the dry pellets are wet down with liquid asphalt that comes in five-gallon metal pails. The Liggite floor-surfacer provides a floor that is said to almost eliminate the drag resistance to vehicular loads common to most mastic floors. It contains a special binder and requires 24 hours to set.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 78.

Plaster, Mortar Mixers

■ A line of plaster, mortar, and concrete mixers is shown in literature from Müller Machinery Co., Inc., P. O. Box 248, Metuchen, N. J. The plaster and mortar mixers illustrated have a one-to-three-bag capacity and hold from 3½ to 9 cubic feet of mixed material. They feature a declutching device and a rubber paddle-shaft protector.

Tilting mixers shown have a capacity of 3 to 6 cubic feet of mixed concrete. Mixing can be done from either side.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 145.

"I'll tell you one thing, boys—if we don't get that new road contract the bottom may drop out of everything."

The Baker-Lull Shoveloader with four-wheel drive and power steering.

New Front-End Loader

■ A front-end loader that lifts 6,000 pounds is announced by Baker-Lull Corp., 314 W. 90th St., Minneapolis, Minn. This latest model of the Shoveloader has positive four-wheel drive and power steering. It is rated at 1½ cubic yards and has a peak capacity of 9,000 pounds.

Power for the unit is supplied by a six-cylinder Hercules engine with a choice of a 93-hp gas unit or a 77-hp diesel engine, each rated at 2,100 rpm. The loader mechanism is powered by a 1,200-psi hydraulic system with gear-type hydraulic pumps.

The unit is designed to downcrowd 25 inches below the tractor level. A 100-inch wheelbase increases stability by allowing the full weight of the machine to be placed on the rear wheels.

Accessories available include a 1¼ or 1½-cubic-yard material bucket, a 2½-cubic-yard coal and snow bucket, lifting forks, and a bulldozer.

For further information write to the company, or use the Request Card at page 18. Circle No. 59.

Enlarged Mortar Mixer

■ An improved mixer with a 3½ to 4½-cubic-foot capacity is announced by Construction Machinery Co., Waterloo, Iowa. The Hoe-Boy features new leak-proof grease seals, anti-friction hoe shaft bearings, and a lowered charging height from 36½ inches to 34 inches.

It is offered with a 2.4 Briggs & Stratton engine for a maximum 3½-cubic-foot batch, or a 3-hp engine for mixing 4½ cubic feet. The Hoe-Boy is available in gas or electric-powered models. It is only 29 inches wide, so that it slips easily through a 30-inch doorway.

For further information write to the company, or use the Request Card at page 18. Circle No. 57.

Belt Conveyor Idlers

■ More than 500 belt conveyor idlers in 34 types are described in a new booklet released by the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.

Light, medium, and heavy-duty 20-degree troughing idlers, two styles of 45-degree idlers, flat belt, belt training, rubber cushion, and the new variable troughing idlers are made in a broad range of roll diameters and belt widths. Return belt idlers and such accessories as idler stands, grease pipe extensions, and a grease seal and bearing extractor are also shown.

Detailed information is given on different types of idlers divided according to the weight and lump size of material to be conveyed. Schematic drawings and dimensional data are included for each type of idler.

Book No. 2416 introduces a new Link-Belt variable troughing idler on which the angle of inclination of the concentrator rolls is adjustable to provide smooth belt transition between troughing idlers and flat pulley.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 146.

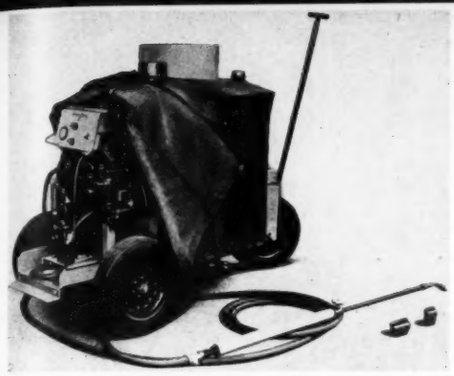
Asphalt-Testing Oven

■ An asphalt-testing oven is shown in literature from Soiltest, Inc., 4522 W. North Ave., Chicago 39, Ill. Model No. RS-12 has been designed to meet ASTM designation D6-39T, "Loss on Heating of Oil and Asphaltic Compounds". With the rotating shelf removed, the oven becomes a utility oven for an analytical laboratory and chemical work.

A feature of the oven is that the rotating shelf motor and reduction gear drive system have been isolated from the chamber temperatures.

Temperature range is 37.8 degrees C to 232 degrees C. The oven uses 115 to 230-volt ac current. Inside dimensions are 1 foot for width, height, and depth.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 30.



The new JO Hypressure Jenny steam cleaner.

Rubber-Tire-Mounted Steam Cleaning Unit

■ A steam cleaner that is mounted to roll over rough ground is announced by the Hypressure Jenny Division, Homestead Valve Mfg. Co., Coraopolis, Pa. The JO Hypressure Jenny steam cleaner runs on 16 x 4-inch rubber-tired wheels and has a welded steel chassis. The unit's nozzle-control system permits the operator to start and stop the steam jet at the cleaning job 100 feet or more from the machine. The manufacturer reports that a full-powered blast is delivered at the cleaning gun from a cold start in less than 90 seconds.

Vapor spray output is 90 gph, but the unit is also available with 120-gph output in the Series 1200 Hypressure Jenny. A zippered canvas cover protects the unit.

For further information write to the company, or use the Request Card at page 18. Circle No. 17.

Data on Plastic Pipe

■ A booklet describing plastic pipe said to be rot, rust, and corrosion-proof is available from the Yardley Plastics Co., 142 Parsons Ave., Columbus 15, Ohio.

The company offers a flexible plastic pipe in sizes from ½ to 6 inches and recommends it for long uninterrupted lines and double-jet pumps. It is made in three grades for varying pressures. The catalog also shows a twin pipe for jet pumps in which the suction and pressure lines are joined together by a fine web to keep the pipe in alignment. For installations requiring numerous take-offs and fittings, a rigid plastic pipe that provides full flow is available.

The booklet also describes insert-type, slip-sleeve, and threaded fittings for the pipe.

Among service, installation, and engineering data included in the pamphlet are dimension and pressure tables and a list of chemical reagents and their effect on the plastic pipe.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 112.

A cofferdam frame is being fabricated on shore. Frames were made up of 14-inch H-beams, welded in rectangular rings around H-beam posts.

New Bascule Bridge Forms Link In City Exp

ANOTHER IMPORTANT LINK in the $70,000,000 Jacksonville, Fla., Expressway will be formed this fall when the gates open on the Gilmore Street low-level bascule bridge over the St. Johns River. Diamond Construction Co., of Savannah, Ga., completed all the substructure work by November, 1952, and a joint venture of Industrial Contracting Co., of Minneapolis, and Allied Structural Steel Co., of Chicago, is now finishing the superstructure.

This $5,000,000 structure will eventually become part of a controlled access-road network, consisting of 43 miles of highways and bridges. Better service for both local and through travelers will be provided by the system, now nearly 50 per cent under contract.

As a hub for several main highways, Jacksonville has suffered difficult traffic conditions for some time. U. S. 1 and U. S. 17, the heavily traveled north-south resort routes; U. S. 90, a vital north-south link; and several local arteries all converge

City Expressway

By ALBERT C. SMITH
Field Editor

on the city's downtown area. And because all the primary routes come together on the west side of St. Johns River, most of the through traffic has to be funneled south and east over a grossly inadequate system of bridges and roads.

Two New Bridges

The major feature of the huge expressway is the rerouting of much of Jacksonville's traffic over two new bridges. One is the recently completed John E. Mathews Bridge, east of the central business section. This $12,000,000 structure has a high-level truss span and carries four 12-foot lanes over its full 8,000-foot length. Starting from the downtown area, the east branch of the expressway leads over the John E. Mathews Bridge to Arlington, a rapidly developing residential section, then goes about four miles toward the beaches, and then south for about 10 miles to U. S. 1.

Another downtown branch will

(Continued on next page)

Give Generously to the Red Cross

H-beam piles in the trestle bents are encased in concrete. Here, a sectional steel casing is dropped around a pile to serve as a form.

New Bascule Bridge Forms Expressway Link

(*Continued from preceding page*)

lead westward over a railroad viaduct to an intersection with U. S. 90, run over the Gilmore Street Bridge, and then southward.

Bascule Span

Because of the light river traffic north of the city, and because of the flat terrain, the Gilmore Street Bridge was designed as a medium-level structure with a movable span over the main channel. The U. S. Army Corps of Engineers required it to have a 174-foot horizontal clearance when open, and a 37-foot clearance above mean sea level when closed.

The 3,667-foot-long bridge rests on two concrete abutments, 23 land piers, and 13 river piers. The 7-inch-thick concrete pavement carries two 26-foot roadways, separated by a 4-foot mall. Curves are superelevated for speeds of 50 mph.

One of the interesting phases of work on the superstructure is the use of continuous steel construction. Both ends of the superstructure consist of a series of three-span beams with 61-87-61 spans. These 36-inch, 194-pound, wide-flange sections are spaced about 7 feet apart.

On the east side there will also be a section of 3-span continuous-plate girders with 130-154-130 spans; ad-

A Bay City crane, operating at street level, uses a bottom-dump concrete bucket for a transit-mix pour on the bridge deck. *C. & E. Photo*

joining the bascule on each side will be 3-span continuous-deck truss sections with 168-224-168 spans.

The double-leaf, Chicago-type bascule will carry a 5-inch steel-grating deck. Two 50-hp motors on each leaf will open or close the leaves in 90 seconds.

On the west side, the four sections of 3-span beams and the one section of 3-span deck truss are supported on 3-shaft-type concrete piers, with separate footings for each shaft. The deck truss and plate girder sections on the east side also rest on 3-shaft piers. The deepest footing goes 63 feet below water.

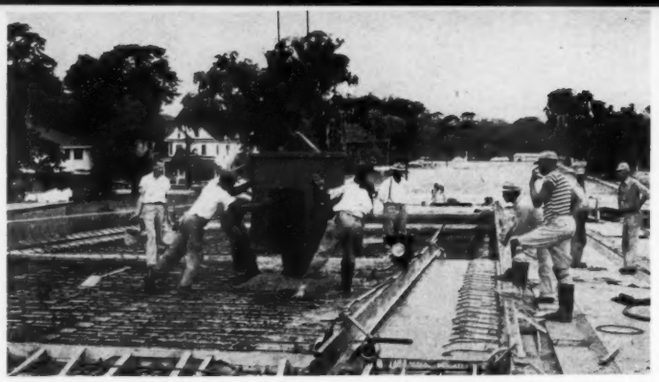
The remainder of the bridge on the east side, consisting of five sections of 3-span beams, is supported on steel H-pile bents encased in concrete. The number of 14-inch bearing piles in a bent varies from 9 to 16. Every third bent is battered longitudinally in both directions.

Diamond Construction Co. started substructure work during September, 1951, and had the job complete in only 13 months. The Florida State Road Department had allotted 720 days for the $1,200,000 contract.

The contractor began work on the land piers on the west side. He first brought in a revolving crane with a 90-foot boom and operated it on rails along the south side of the bridge line.

All the piers are supported on

(Continued on next page)



A bucket of concrete is dumped on the deck of the Gilmore Street Bridge. Afterward, the concrete is vibrated by a Master screed. *C. & E. Photo*

New Bascule Bridge Forms Expressway Link

(Continued from preceding page)

14-inch H-piles driven to 60 tons bearing. A McKiernan-Terry 11B3 hammer, with a spud lead suspended from the revolving crane, drove all the piles. Variable soil conditions made it impossible to determine the average depth that piles could be driven—even within the same footing. Often, piles only 4 feet apart varied as much as 12 feet in their driven length. Consequently, the contractor's decision to order all piles 60 feet long and to splice them if necessary proved to be a good one.

Cofferdams

Probably the operations that contributed most to completing the job ahead of schedule were the fabricating and setting of the cofferdams.

Because each of the three pier shafts required a separate footing, the contractor decided to build a cofferdam for each. The frames were constructed entirely of 14-inch H-beams, welded in rectangular rings around four H-beam posts. The number of rings varied from two to seven.

Setting the frames proved to be one of the most interesting phases of the construction. Diamond fabricated the frames on shore, tied them together in groups of three, and floated them to the site on barges.

The middle frame was set at the center of a barge so that the two other frames, tied to the middle frame, projected over the water. Surveyors, with Motorola radio contact to all of the contractor's craft, directed the positioning of the barge until the three tied frames were exactly over the footing locations. Spud piles were then driven inside each outside corner of the projecting frames. With the spuds in place, two barge-mounted revolving cranes raised the tied frames, the barge was moved out from under them, the frames were lowered to the desired depth and bolted to the spuds.

When the frames were in place, sheet piles were brought out and driven around them with a McKiernan-Terry 10B3 hammer. The inside of the cofferdam was cleaned out with a clamshell and a 10-inch air lift, powered by a 600-cfm compressor. H-piles were then driven from above water by a steel template and a follower. Nearly 42,000 feet of 14-inch bearing piles were driven on the job. Conditions varied, but generally, the piles were driven through rock strata to hard marl.

As soon as each coffer was prepared, concrete was poured for the seal. Diamond built a dock on the west shore, where transit-mix trucks dumped concrete into 2-yard bottom-dump buckets. Revolving cranes kept three barges, each carrying four buckets, shuttling back and forth to the coffers.

Another barge-mounted revolving crane dumped the buckets into a hopper which fed a tremie concrete system. Up to 900 yards a day was poured this way.

After a suitable period, the coffer was dewatered with pumps. As the water level dropped, steel braces were set in the corners of the frame rings. Both cinders and sawdust were placed behind the sheet piles to seal out water.

Wood shaft forms with plywood facing were also prefabricated on shore. They were hauled out in 25-foot sections, complete with reinforcing, and set in place. Because of their 4-side taper, they could be reused on several lifts simply by cutting off the bottoms. All caps were poured with steel forms. Concrete was placed with bottom-dump buckets in the same manner as the footings.

Pile Bents

All of the continuous beams on the east side were supported on bents of concrete-encased H-piles. After the piles in each bent were driven and cut off, a sectional steel casing

was dropped around each pile to act as a concrete form. The contractor made the casings from fabricated 4-foot-long sections. Each section consisted of two semicircular plates bolted as a hinge along one side and tied together along the opposite side with a continuous pin. About ten sections were used to form the casing, with a single continuous pin locking them together.

With templates inside acting as a concentric guide, the casing was set over the pile, then dropped to the river bottom. About nine casings were made up so that an entire bent could be poured at the same time.

When all the casings were in place, a 4-inch air-lift was lowered inside of each one to excavate the river muck. Concrete was handled in the usual manner and poured inside with a 6-inch tremie pipe. Dismantling was done simply by pulling the long continuous pin and lifting the loosened casing from the concrete-encased pile.

Fenders

Another time-saving device used by Diamond to position timber piles in the fender system was a job-made template. Ordinarily, a considerable amount of surveying would have been necessary to get all the piles driven in their proper place in the complicated fender system. To speed the operation and to eliminate the need for a standby survey crew, the contractor had a complete fender staked out to scale on a flat area on shore. He then welded a network of 3 x 3 x ¼-inch steel angles around the stakes. This served as a template and had openings to position each pile.

When completed, the network of angles was set on a long horizontal H-beam, tied to it, and hauled to the site. A line of H-piles had already been driven next to the fender line, and outriggers were built out to support the horizontal H-beam with its template on top. In this way, the timber piles were simply dropped through the slots in the template and then driven. The system proved to be fast, accurate, and economical.

Superstructure

As the structural steel was being erected, Industrial Contracting Co. followed close behind to pour the reinforced-concrete deck. The first three or four spans on the west side were poured with transit-mix concrete from a bottom-dump bucket, handled by a Bay City CraneMobile which operated at street level. On the higher spans, the transit-mix trucks made the haul over the completed deck section and dumped into Whiteman power buggies.

Deck forms consisted of plywood panels, backed up by double 2 x 4's, about 2 feet on center in one direction, and double 2 x 6's, about 6 feet on center in the opposite direction. They were hung from the beams with Dayton U-type hangers.

Pours were first made at the points of maximum deflection to eliminate any undesirable stresses in the beams. Concrete was vibrated with a gasoline-powered Syntron and finished with a Master vibratory screed.

Because of the long spans used with the continuous beams, a steel spiral was welded along the top flange at each mid-point to reduce deflection.

Personnel

B. E. Crumrine was superintendent for Diamond Construction Co., and P. Prendergast was superintendent for Industrial Construction Co.

Resident engineer for the consulting engineers, Reynolds, Smith, & Hills, was C. L. Lash. The Jacksonville Expressway is under the direction of the Florida State Road Department, which is headed by Sam P. Turnbull, state highway engineer.

Truck-Exhaust Device Stops Noise Nuisance

■ A device which eliminates loud exhaust noises from heavy-duty Ford trucks when they are slowed down or driven from grades has been placed in production by the Ford Division of the Ford Motor Co., P. O. Box 638, Dearborn, Mich. The noises are characteristic of a heavy gasoline truck engine that is being pushed or motored against a closed throttle.

With the throttle in the closed or idle position, the exhaust noise is eliminated by upsetting the idle fuel mixture to a point where it is not capable of supporting combustion. This is done by controlling the air intake with the new device.

It has been built into the carburetor of the company's 1953 models F-750, F-800, and F-900 heavy-duty trucks. All three are powered by V-8 OHV Cargo King engines. It can also be installed in 1952 Ford V-8 OHV engines in this class by replacing the carburetors.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 100.

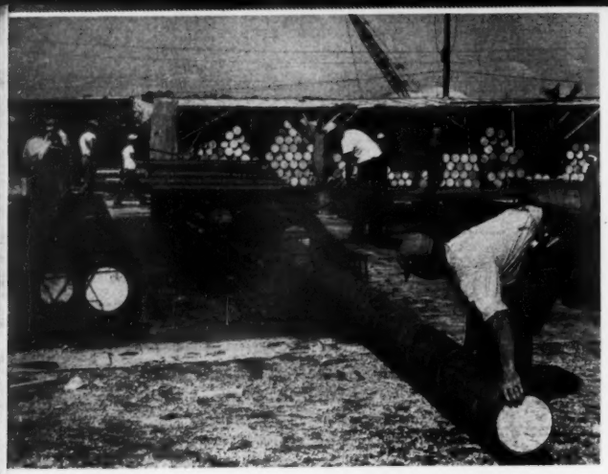
Portable Two-Way Radios

■ A portable two-way radio set is shown in literature from the Industrial Radio Corp., 2105 S. State St., Chicago, Ill.

The Pak-Fone is offered in two frequency ranges. Type PS40 operates at 25 to 50 mc and PS150 on 152 to 174 mc. Power output of the units is 1 watt and ¾ watt, respectively. Dimensions are 4½ by 10 by 11½ inches. The sets weigh about 20 pounds.

Optional equipment includes an external power supply and an internal rechargeable power supply.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 55.



After the prefabricated cages of reinforcing are positioned on the casting beds, Sonovoid tubes are placed inside to create the required voids.

Wood forms hinged to the casting beds are then turned up and held in place with cross brackets. Wood gussets hold the tubes in place

Transit-mix concrete is chuted into the forms and vibrated internally to move it around the tubes.

Pictures above show how:

Thin-Shell Precast Speeds Warehouse

THIN - SHELL precast concrete framing, an entirely new development in concrete construction, is making big strides this year in its struggle for acceptance. One of the most significant gains will be made this month when three big precast warehouses are completed at the Great Lakes Naval Training Station near Chicago.

The huge job is being done by the Corbetta Construction Co., Inc., New York, for the Bureau of Yards and Docks, U. S. Navy. Corbetta is one of the country's leading contractors in the field of precast concrete construction.

Pioneered by the Navy's chief designing engineer, Arsham Amirikian, thin-shell precasting is now coming into its own. It is characterized by ribbed panels and hollow-section frames that are said to contain less than one-half the amount of concrete required for a comparable poured-in-place framing.

Warehouse Job

Corbetta's job consisted primarily of constructing three general-purpose warehouses, each 609 feet long and 200 feet wide. Bays are 22 feet 6 inches on center. Across the width are four columns providing a center span of 70 feet 4 inches, and 2 outside spans of 63 feet 10 inches.

With the exception of footings and

The precast units are lifted by suction mats on this Ross straddle truck and hauled to the point of erection.

A girder is lowered into place by this P&H crane. The splice will be made by welding the rods and grouting the joint pockets.

The finished product is a 600 x 200-foot warehouse completely precast, including the thin-shell wall and roof panels. Corbetta Construction Co., New York, is the contractor.

Concrete Framing Construction

pedestals, each warehouse is almost entirely precast.

The two basic applications of thin-shell precasting on the warehouses are ribbed panels and hollow-section frames. Ribbed panels are used for the walls and roof and hollow sections, for the rigid frame. The frame components are designed so that the splices are located at points of inflection.

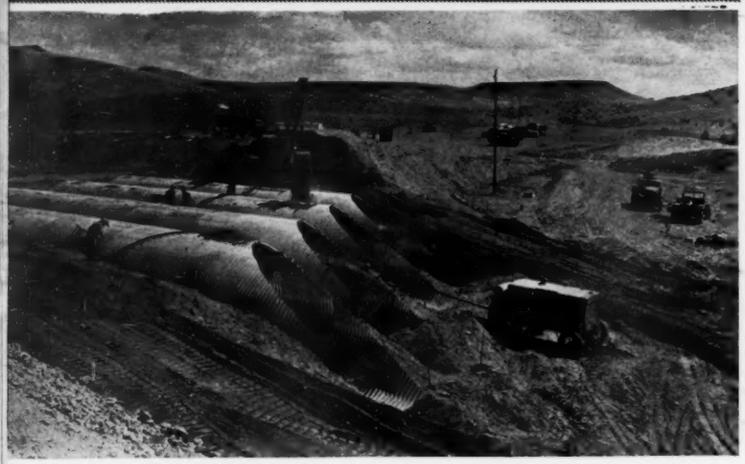
The original design called for fabricating the hollow frames by first forming two channel-shaped members and then tying them together to form a box section. However, further investigation by the designer and the contractor developed the idea of using Sonovoid tubes inside the member to create the voids. This method simplified precasting and added only 3.4 per cent weight.

The rigid frame consists of only five basic units: two exterior L-head columns, two interior columns, two T-heads which rest on the interior columns, two girders which span the outside bents between the L-heads and the T-heads, and one girder which spans between the two T-heads.

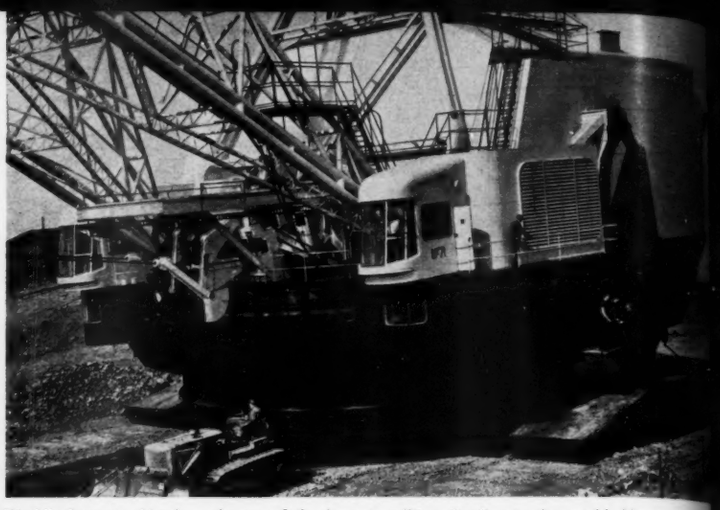
One-Day Schedule

Corbetta's schedule calls for completing one bay daily. This includes all wall and roof panels in addition

(Continued on next page)



Steel Culverts—Steel culverts are set in place on a highway construction job near Hillsboro, N. Mex. Henry Thygesen Co., Albuquerque, N. Mex., uses a Caterpillar diesel engine to power a Gardner-Denver compressor furnishing air for hammers and tampers.



World's Largest—Here's a closeup of the largest walking dragline in the world. Now stripping iron ore in England, the 1,650-ton machine has a 282-foot tubular boom and a 20-yard bucket. Farval centralized systems handle the huge lubrication job.

Warehouse Construction

(*Continued from preceding page*)

to the rigid frame. To do this, he uses two crews—one to precast and one to erect.

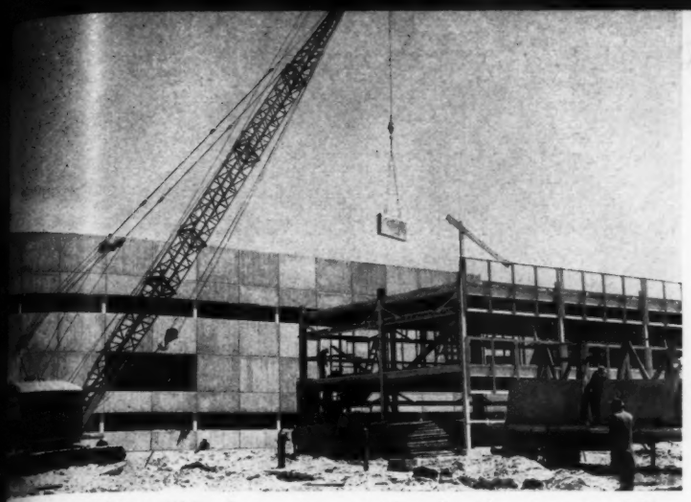
The precasting yard is set up on the site a short haul from the warehouses. All of the rigid frame units are poured on concrete beds with hinged wooden sides for simple setting and stripping.

Reinforcing steel cages are fabricated in a special yard next to the precasting area and placed intact on the concrete bed. Then 10 or 12-inch Sonovoid tubes are placed inside the cages. The wooden sides are tilted upward and secured in place, and wood brackets are set over the top to hold the forms together. Small wood gussets projecting downward from the brackets keep the Sonovoids in place during the pour.

Ready-mix concrete, 4,000-pound strength in 28 days, is then placed inside the forms and vibrated internally with a Mall vibrator. The units are sprayed with Hydrocide

Use the
Request Cards
Between
Pages 18 & 19
To Obtain
Further
Information
or Printed
Matter on
Any Product
Advertised
or Described
Editorially
in This
Issue

Use the Request Cards Between Pages 18 & 19 To Obtain Further Information or Printed Matter on Any Product Advertised or Described Editorially in This Issue



Insulated Curtain Walls—Precast concrete curtain walls with an inner core of Fiberglas insulation are being used at a new plant in Calverton, Long Island, N. Y. Here, a Lima crane transfers one of the units from a trailer to the steel frame.

Grout Prevents Slides—Workmen at right spray a cement coat on the rocky wall of a former railroad cut in San Francisco, Calif., to prevent slides into the road below. The old railroad bed is being converted into a three-lane highway. *Wide World Photo*

curing compound and left to stand overnight. The next day, the forms are stripped, the units are stockpiled, and allowed to cure two days before being erected.

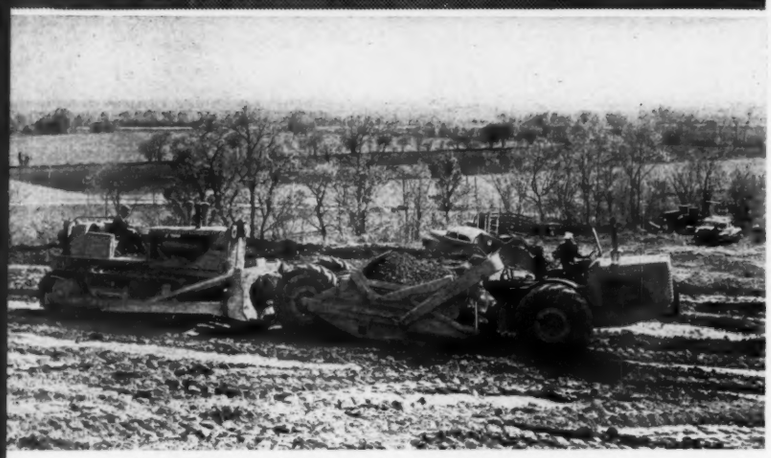
The ribbed panels, made in several shapes, consist of a thin slab and stiffening ribs arranged to form a miniature system of framing. Panels are about 22 feet long, 5 feet wide, and have six ribs. Outside ribs are 10 inches deep, while the shells are 1¼ inches thick. Webs are reinforced with steel rods, and shells with wire mesh.

The panels are cast on concrete molds. Hinged steel channels form the sides. Concrete is chuted in from ready-mix trucks and finished with a Master vibratory screed. The curing procedure is similar to that used on the hollow frames.

Handling

Both the hollow frames and the ribbed panels require special handling. And practically all of it is done by a modified Ross straddle truck. This unit hauls all panel and

(*Concluded on next page*)



Levee Construction—Levee renewal work on the Missouri River progresses rapidly as Allis-Chalmers TS-200 motor scrapers work 20 hours a day on an average 1½-mile haul near Amazonia, Mo. The Smart Construction Co. of St. Joseph, Mo., is doing the work as part of the Pick-Sloan program.

Ripper Starts Trench—Savings in blasting costs on a pipeline job were made by the Turner-Huffman-Pierce Construction Co., Odessa, Texas, when it used two International TD-24's to pull a ripper through the hard rock, making it possible to dig most of the 8-mile line with a ditcher.

McIntosh's Buffalo-Springfield rollers compact a smooth sub-base for the Atlanta Truck Route running from the River Bridge to Marietta St.—a 4-lane, 52-ft. wide superhighway, with paving 10½" thick. Right: O. C. McCURLEY.

"Wouldn't Swap My Buffalo-Springfield Rollers for any other roller made"

O. C. McCurley, Sup't. for McIntosh Paving Co., of Atlanta, knows the paving business, and the machines that do the paving. The asphalt paving business is his career.

Yancey Brothers Co., Distributor in Atlanta and Augusta, Ga., asked him what he thinks of the three Buffalo-Springfield Rollers he's using on this job. Here's his answer:

"I wouldn't swap my Buffalo-Springfield Rollers for any others on the market today. They are far ahead of any other rollers built. I know, because I have tried them all."

The rollers he speaks of are veterans of years of hard work, and miles of paving. The oldest one on the Atlanta Truck Route job is a three-wheel 1930 model, and the newest one was bought in 1948. The other tandem roller on the job is a 1937 model. All three have been used hard since McIntosh bought them, and they are all giving trouble-free service on this job, rolling 25,000 tons of stone base.

There's a Buffalo-Springfield Distributor conveniently located to serve you.

Put Buffalo-Springfield Rollers on your next paving job!

WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF ROAD ROLLERS

BUFFALO SPRINGFIELD

THE STANDARD OF COMPARISON

SPRINGFIELD, OHIO

Precast Concrete Framing

(*Continued from preceding page*)

rigid-frame members to the curing piles and also out to the erection. Corbetta modified the truck by adding vacuum mats with a special pump to supply the suction. Even the 14-ton T-heads can be handled this way.

The one-day erection procedure begins with one of the L-head exterior columns. A P&H crane hoists it into the vertical position as a wood frame tower is rolled in to support and align its L-head. Next, an interior column is placed and braced, a T-head set on top, and a tower moved in below each end of the head. A girder is then lowered into place between the L-head and the T-head. This procedure is repeated on the other exterior bent and then in the middle. When the complete frame is in place, the splices are made by welding the reinforcing bars and grouting the joint pockets. Struts go between every other bay.

Each rigid frame is 1 foot 6 inches wide, including columns. L-heads are 22 feet 2 inches from the base to the top. Girders are 3 feet deep, and T-heads taper to a maximum depth of about 5 feet 4 inches.

When the rigid frame is set, wall and roof panels are placed. Small steel plates, set in both the frames and the panels when they are cast, are welded to tie all the units together. Built-up roofing is placed on top.

Louis Corbetta is in charge of the work for the Corbetta Construction Co. Mario Egidi is project manager, and Albert Olsen is general superintendent. Lt. Commander E. C. McBurney is resident officer for the Public Works Office of the 9th Naval District, which is headed by Capt. H. C. Shaid.

Penn. Turnpike Extension—Production rates of 1,000 cubic yards per hour are being turned in by this Euclid loader spread on G. Langenfelder & Son's job on the eastern extension of the Pennsylvania Turnpike. The loader is pulled and pushed by Allis-Chalmers HD20's and loads a fleet of bottom-dumps.

New Pumping Station—Steel sheet piling for the new Delta Avenue pumping station in Cincinnati, Ohio, is driven into the earth by this Vulcan No. 1 hammer with hanging leads. Penker Construction Co., Cincinnati, using a Lorain crane, drives twelve 35-foot piles per 8-hour day.

Equipment Financing

Despite the high level in construction expenditures for 1953, competition for construction contracts is increasing, and contractors are finding that speed and efficiency of operation are becoming more important than ever. These findings are based on a sampling of contractors by C. I. T. Corp., a construction equipment financing firm.

In order to meet competition, contractors must offset increased costs with faster and more efficient equipment. To acquire equipment without impairing his financial position, a contractor may generally take advantage of three sources of funds: a short term bank loan, limited credit from machinery suppliers, and a long-term equipment-funding loan from an industrial financing firm.

Because of the limited time factor in repaying bank loans, and because suppliers extending credit must set their terms to meet their own needs, two of these methods may prove inadequate for the contractor.

Under an equipment-funding plan from an organization specializing in financing industrial equipment, contractors can obtain repayment terms to fit their needs. The contractor can purchase equipment from several manufacturers and consolidate the purchases under one contract with the financing agency. Thus, he has the advantage of using cost-saving equipment while keeping his financial condition liquid enough to meet payroll, materials, and other costs. Contractors who need additional working capital can also use their equipment fleets as a borrowing base to secure funds from an industrial financing firm.

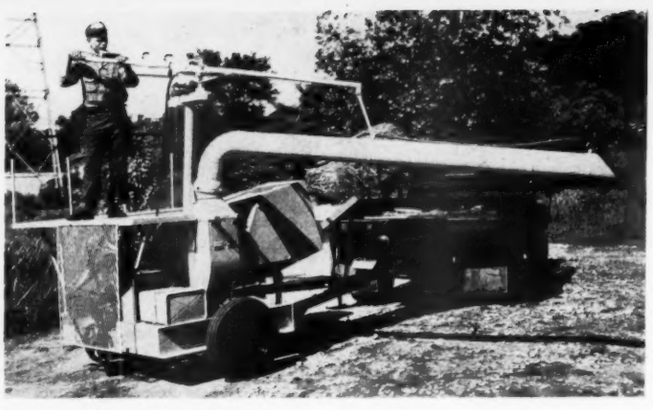
Folder on Bulk Conveyor

■ Bulk conveyors for sand, dirt, gravel, and similar materials are described in a folder from Lake Shore Engineering Co., 9257 Laramie Ave., Iron Mountain, Mich.

One model that comes in 12, 14, and 20-foot lengths moves up to 253 tons of material an hour. The unit is powered by a 1 to 2-hp motor or a 2.3-hp gas engine. It comes on wheels or with a trail hoist.

A second type handles bulk and packaged materials. Capacity for bulk material is 103 tons per hour. Other models include one with a hydraulic motor that operates from any truck engine through the power takeoff, and a one-man aluminum conveyor.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 10.



The Finn mulch spreading machine.

New Mulch Spreader

■ A new mulch spreader that distributes hay, straw, wood shavings, and other materials on newly seeded areas is made by The Finn Equipment Co., 2525 Duck Creek Road, Cincinnati 8, Ohio. The portable unit is towed behind a truck carrying the mulching material.

A high-velocity air blast carries the material up to 50 feet from the machine so that it will fall in an even coating. The mulch spreader also has a pumping unit to spread liquids with or without mulch. This permits the use of adhesives with the mulch for covering steep slopes or embankments. The machine is also used for spreading liquid fertilizer and can be converted into a mist blower for spreading chemicals in insect control and weed killing.

For further information write the company, or use the Request Card at page 18. Circle No. 153.

Wire-Rope Information On Contracting Equipment

■ Literature specifying the types of wire rope recommended for various pieces of construction equipment is available from Macwhyte Co., 2940 14th Ave., Kenosha, Wis. The booklet begins with a description of the different types of wire rope made and includes a section on the difference between lang lay and regular lay rope. The wire ropes are compared in terms of flexibility and fatigue and abrasion resistance.

Each type of machine covered is illustrated with an outline drawing that indicates the specific uses of wire rope on that particular unit. The wire-rope recommendations are then listed by size, type, and use. Equipment discussed includes a variety of shovels, a drag line, a clamshell, a locomotive crane, a trench hoe, and a backfiller. A skimmer, a carry-type scraper, a drag scraper, and a slack-line cableway excavator are other units mentioned.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 31.

Galion Appoints Little

Porter Little, Jr., has been named district representative of rollers and motor graders for the state of Texas by The Galion Iron Works & Mfg. Co., Galion, Ohio. He succeeds A. L. McCallum. Mr. Little has had several years of experience in servicing and selling industrial and road machinery.

Data on Bituminous Paver

■ A smaller version of the Adnun Black Top Paver is shown in literature from the Foote Construction Equipment Div., Blaw-Knox Co., Nunda, N. Y. In operation, the Adnun Junior Model 8 is towed by the truck that dumps into the 2-ton hopper. A 12-hp engine supplies power for maneuvering backward and forward and for traveling empty to new locations on the job.

A feature of the unit is the oscillating cutter bar screed that cuts off the material. The text points out that this type of screed is superior to drag-types that cause subsurface tears and trowel fats to the surface.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 9.

Distributor Doings

Lippmann Names Three Dealers

Three new distributors have been named by Lippmann Engineering Works, Milwaukee, Wis., manufacturer of crushing, screening, and conveying machinery.

Walton Equipment Co., Inc., 39 Cortlandt St., New York 7, N. Y., will cover eastern New York, and Casey-Metcalfe Machinery Co., 5107 Telegraph Road, Los Angeles 21, Calif., will handle distribution in the lower half of California. Serving British Columbia, Canada, will be Vancouver Equipment Corp., Ltd., 285 E. First Ave., Vancouver, B. C.

International Distributors

The International Mfg. Co., 2249 S. Deleware, Denver 10, Colo., has appointed two new distributors in the greater New York-New Jersey area. They are the Stillwell Supply Corp., 44-68 Vernon Blvd., Long Island City 1, N. Y., and the Contractors Service & Supply Co., Inc., 100 Fycke Lane, Englewood, N. J.

The International Mfg. Co., manufacturing and design engineers, offers a complete line of space heaters to industry.

New Marion Distributor

Kern-Limerick, Inc., 115 N. Spring St., Little Rock, Ark., is a new distributor for products manufactured by Marion Power Shovel Co., Marion, Ohio. The company will serve Arkansas, with the exception of a few counties in the northern part of the state. R. C. Limerick is president and Roy L. McDonald, Jr., sales manager for the company, which handles road building and maintenance machinery, contractor's equipment, and supplies.

Olin Retires From H. O. Penn

After completing 19 years as sales representative for the H. O. Penn Machinery Co., Inc., New York, N. Y., distributor of Caterpillar equipment, Bruff W. Olin has retired from active service. His territory included Sullivan and Ulster counties.

Mr. Olin has worked for Link-Belt Speeder Corp., and W. H. Anderson Tool & Supply Co. Cliff Warren succeeds him.

New Cleaver-Brooks Dealer

D. E. McCulley Co., Omaha, Nebr., has been named as exclusive representative for the Cleaver-Brooks Co., Milwaukee, Wis., in western Iowa and central and eastern Nebraska. The distributing firm will handle sales of Cleaver-Brooks' self-contained boiler equipment.

Clayton Appoints Dealer

Borchert-Ingersoll, Inc., St. Paul, Minn., has been named distributor for Clayton Mfg. Co., El Monte, Calif. The dealer will cover Minnesota and Douglas County in Wisconsin in handling the Clayton automatic steam generators.

Wooldridge Appoints Dealer

Interstate Equipment Co., with headquarters at 131 N. Center St., Statesville, N. C., has been appointed exclusive dealer for Wooldridge earth-moving equipment throughout the state. The complete line being offered includes the new Terra Cobra self-propelled scraper, tractor-drawn scrapers, cable control units, rippers, and bulldozers.

Hensley Names Two Dealers

The Hensley Equipment Co., 816 98th Ave., Oakland, Calif., now in the process of establishing exclusive dealerships throughout the western states, has named two equipment stores as its dealers in their respective areas.

Serving the San Diego, Calif., area is the Diesel Construction Co. of that city. Wilson Equipment & Supply Co. of Cheyenne and Casper, Wyo., will act as Hensley's distributor in that area. Both will handle Hensley's line of dozer rippers and brush rakes, end bits, track rollers, and allied tractor attachments.

Ehrbar Opens New Plant

Edward Ehrbar, Inc., 29 Meserole Ave., Brooklyn 22, N. Y., a 50-year-old construction-equipment firm, has opened a modern plant in Poughkeepsie, N. Y., on South Bend, Route 9.

The new branch will handle sales and service in the Poughkeepsie area on International diesel tractors, bulldozers, and scrapers; Hough Payloaders; Adams motor graders; Barber-Greene asphalt finishers, ditchers, and bucket-loaders; and Thew-Lorain shovels and cranes.

Harold E. Wildhack, a native of Syracuse, is manager of the branch.

How "Cranes-on-Rubber" Got Their Start

Back in 1918, General Pershing asked for 125 mobile cranes on truck chassis to work on the docks in France to speed up the handling of war material. But, World War I ended before such cranes were available. However, F. A. Smythe, then President of The Thew Shovel Co. in Lorain, Ohio, developed the idea and, late in 1918, the Universal Crane Co., a subsidiary of Thew, marketed the first so-called "Truck Crane".

The first truck crane — 1918 model

In the years that followed, much happened to "truck cranes". They became accepted tools of the construction industry, capacities increased, booms became longer, and finally exceeded the capabilities of the commercial truck chassis as mountings. These were replaced with a heavy-duty carrier especially designed for the live, highly-concentrated loads of shovel-crane use. The first such carrier, on which was mounted a Lorain turntable, was the Lorain Moto-Crane, developed and produced by Thew in 1940. Thew Shovel Co. still designs and builds Moto-Cranes in their own plants.

The first Universal Truck Crane had a lifting capacity of 3 tons with a maximum boom of 20 ft. Today, Moto-Cranes are made in a variety of capacities from 6 to 45 tons, with highway speeds up to 33 m.p.h. Rear axles mounted on rocker beams, air steer, large dual wheels, ample tractive effort and the availability of front end drive make them exceptionally efficient for off-the-road travel over soft and rough ground.

World's largest crane on rubber today

While the trade-marked name for the Lorain 2-engine rubber-tire machine is "Moto-Crane", it has been many years since their use has been limited to lifting crane service only. Front ends are also available for shovel, dragline, clamshell, hoe and scoop shovel use as well.

Medium-Duty Trucks With LPG Fuel System

■ Five medium-duty truck models with liquefied petroleum-gas fuel systems have been placed in production by the International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

The RP-160 Series in LPG-powered models range from 14,000 to 17,000 pounds gvw. The models include the RP-164 Loadstar for heavy hauling, and RP-165 Roadliner for over-the-road tractor service. The engine used is the 108-hp valve-in-head International Silver Diamond 240.

The International Model RP-160 truck with LPG fuel system.

Forty-three-gallon water capacity (approximately 34-gallon LPG) single or dual fuel tanks are available in the 130-inch-wheelbase models. Forty-three or 62-gallon water capacity (approximately 34 or 50-gallon LPG) single or dual tanks are available in 142, 154, and 172-inch-wheelbase models.

The company states that liquefied petroleum gas is in abundant supply and is generally less expensive than gasoline.

For further information write to the company, or use the Request Card at page 18. Circle No. 121.

Voids in Concrete Slabs Made With Fiber Tubes

■ Laminated fiber tubes are now being used to form voids in concrete slabs. How this has been done on a number of jobs is told in literature from the Construction Products Division, Sonoco Products Co., Hartsville, S. C.

Sonovoid fiber tubes help to reduce the amount of concrete below the neutral axis in reinforced-concrete work. The literature describes a job in which the tubes were used in 101,000 square feet of slab floors and roof spans in a high school building.

A second job description tells how the tubes have been used to create voids in curved precast arch sections. There are also details on how prestressed, pretensioned, and concrete deck slabs with hollow spaces made with the fiber tubes were used on a bridge.

The tubes are available in lengths up to 24 feet or longer on special order and come in 27 sizes from 2 inches to 36.9 inches OD.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 47.

Waterproofing Compounds

■ A variety of waterproofing surfacers are covered in literature from the Meco Maintenance Engineering Co., 16 W. Johnson St., Philadelphia 44, Pa. Included is Sealtite, a liquid which, when used either with neat portland cement for severe conditions or with portland cement, sand, and water for ordinary cases, will produce a weatherproof, oil, grease, and acid-resisting concrete seal. According to the manufacturer, the product bonds to old masonry or concrete above or below grade.

The company also offers an above-grade waterproofing for interior and exterior walls. Stazdry is a permanent-type treatment that is acid and alkali-resistant and is said not to check, crack, or peel.

Another product, Wago, is used to construct waterproof floors over concrete or wood construction.

A roof resurfacer, Nuplastik, waterproofs, preserves, and protects old and new roofs.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 158.

Insure your own personal security and that of the nation by regular investment in U. S. Defense Bonds.

Air-Powered Saw Features Reciprocating Dual Blade

■ An air-powered saw with reciprocating twin blades is shown in literature from the Wright Power Saw & Tool Corp., 292 Longbrook Ave., Stratford, Conn. The saw, which weighs 14½ pounds including the saw blades, runs on an air consumption of less than 60 cfm at an air pressure of 70 to 100 psi.

The manufacturer claims that the Wright saw does anything a hand saw can do but does it considerably faster. The literature illustrates the saw being used on piling jobs where it is said to be more efficient than other types of saws. A further advantage claimed is that it can be used in hard-to-get-at places and at difficult angles. An unusual feature of the saw is that it can be used for underwater sawing.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 75.

Need information about equipment? See card inserted at page 18.

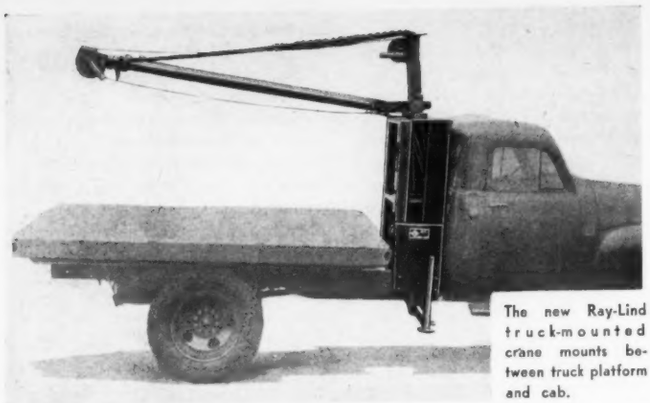
Tires for Contractors

■ A line of heavy-duty truck tires is covered in a catalog from the Armstrong Rubber Co., West Haven, Conn. Among those illustrated is a tire for the drive wheels of road graders and road-maintenance machinery. In use, the open-center tread of this tire is said to offer a self-cleaning action that prevents clogging. In addition, the booklet illustrates a front-wheel road-grader tire.

Other tires of interest to contractors include a lug tire made for on-and-off the road service that is recommended for use on dump trucks, concrete mixers, and similar vehicles.

An extra-ply tire for off-the-road service is also illustrated. Other truck tires include a low-platform trailer tire for use in transporting graders, cranes, power shovels, and other heavy equipment.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 110.



The new Ray-Lind truck-mounted crane mounts between truck platform and cab.

Truck-Mounted Crane

■ A truck-mounted crane is offered in ½ to 2-ton-lift models by the Lind Mfg. Co., Iron River, Mich. The crane unit mounts directly behind the cab and occupies from 16 to 18 inches of space. There is no reduction in truck body or platform capacity, and the entire load-carrying capacity of the bed is retained. There is no need to cut or alter the truck body for installation, according to the manufacturer. The body is simply moved back on the frame.

The loader is made in two models—one with an elevating mast and one with a fold-over superstructure. In the latter model, the top portion of the structure can be folded down for traveling and low clearance.

Standard models will pick up loads from any radius up to 16 feet. On the fold-over models, the boom swings 170 degrees, and on the elevating mast models, the swing is 360 degrees.

Power for hoisting is supplied by the truck engine through a power takeoff.

For further information write to the company, or use the Request Card at page 18. Circle No. 148.

Details on Hard-Facing

■ A new brochure on hard-facings recommends specific rods for over one thousand individual pieces of equipment subjected to impact and abrasion. The booklet features the line of hard-facing metals offered by the Mir-O-Col Alloy Co., 312 N. Avenue 21, Los Angeles 31, Calif.

The technical data section of the literature discusses such questions as what metals can be hard-faced, the effect of heat on metals, depositing single narrow heads, hard-facing with moderate buildup, and other pertinent information.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 40.

Hewitt-Robins Officer

Austin Goodyear, general manager of the rubber and conveyors divisions of Hewitt-Robins, Inc., Stamford, Conn., has been elected a vice president of the company.

Since joining Hewitt-Robins in 1941, Mr. Goodyear has served as production manager of its Passaic, N. J., plant and general manager of the conveyors division. Last year, he was named a director of the company, manufacturer of conveyor machinery, vibrating screens, and industrial rubber products.

Device Fells Trees With Hydraulic Wedge

■ A new hydraulic wedge for felling trees has been announced by the Hufford Machine Works, Inc., 1700 E. Grand Ave., El Segundo, Calif. The device is made to replace the usual sledge hammer and steel or wood wedges.

The Hydra-Wedge is an integral unit consisting of a manually operated hydraulic pump, a power cylinder, and a tapered wedge attached to the end of the piston rod. The wedge is sheathed on each side by two thin blades hinged to the main cylinder casting. In use, these blades are inserted in the saw kerf cut in the trunk. Pumping the handle forces the wedge between the blades and produces a lifting force up to 90,000 pounds.

If insufficient lift is obtained for tipping slanted trees at one setting, the tree may be wedged, and, by reversing the pump, the device may be backed out and re-inserted deeper into the kerf.

The Hydra-Wedge weighs approximately 20 pounds and is 24 inches long. It can be slung over the shoulder of the operator.

For further information write to the company, or use the Request Card at page 18. Circle No. 149.

Hand and Motor Winches

■ Hand and motor winches are shown in literature from the Stephens-Adamson Mfg. Co., Aurora, Ill.

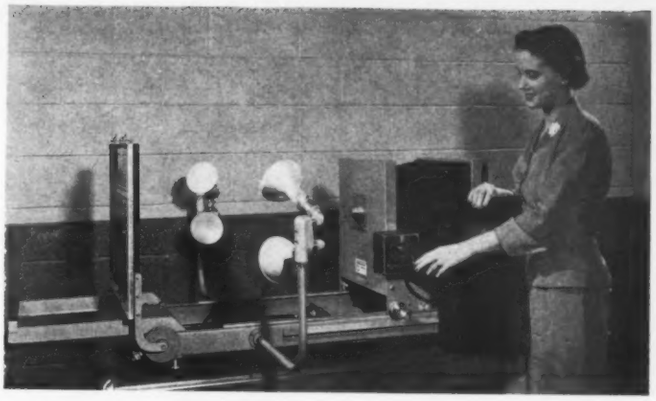
A floor-mounted motor-driven model, the K-5, is heavy enough to lift light elevators. It is available with either a 3 or 5-hp reversible motor to pull loads of 1,800 or 3,000 pounds respectively. With special gear reduction, pulling speed on this model can be increased to 50 fpm.

The booklet also describes a lighter type, the K-2 series, which can be furnished with 1, 1½, or 2-hp motors. Load capacity is 1,400 pounds at a rope speed of 25 fpm.

A third series of floor-mounted models for hoisting, Style K0, has a V-belt drive. The motor is mounted on a swinging base to permit tension-adjustment. Capacity is 1,400 pounds.

Wall-mounted hand winches illustrated have capacities from 500 to 2,000 pounds. They feature a self-locking worm-gear drive that holds the load at any point. The crank must be turned in the reverse direction to lower the load.

To obtain this literature write to the company and request Bulletin 853, or use the Request Card at page 18. Circle No. 109.



Dry-Process Camera

■ A new and faster dry-process copying camera with automatically controlled exposure speed and lighting is announced by the Haloid Co., Haloid St., Rochester 3, N. Y.

The camera reduces engineering drawings or other copy up to 17 x 22 inches on to an 8½ x 13-inch plate from which offset paper masters are made for running off multiple copies on an offset duplicator. Copies can also be made on a diazo machine using a translucent print made by xerography as original copy.

Heretofore, drawings were copied size for size in the XeroX camera and limited to 8½ x 11-inch originals. Now the new No. 4 Lith-Master camera permits reduction to 50 per cent or enlargement to 150 per cent of the original size on to an 8½ to 13-inch plate.

Xerography, a dry, direct positive, electrostatic reproduction system requires no water, chemicals, film, darkroom, or sensitized materials.

For further information write to the company, or use the Request Card at page 18. Circle No. 150.

Roller Chain Wheels

■ Roller chain wheels with taper bushings are illustrated in literature from Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. The sprocket wheels are designed to provide secure mounting on a shaft equivalent to a shrink fit. Set screws force and hold the split tapered bushing in the tapered bore of the wheel, causing it to clamp onto the shaft.

The line includes wheels for the three most popular sizes of double-width chain.

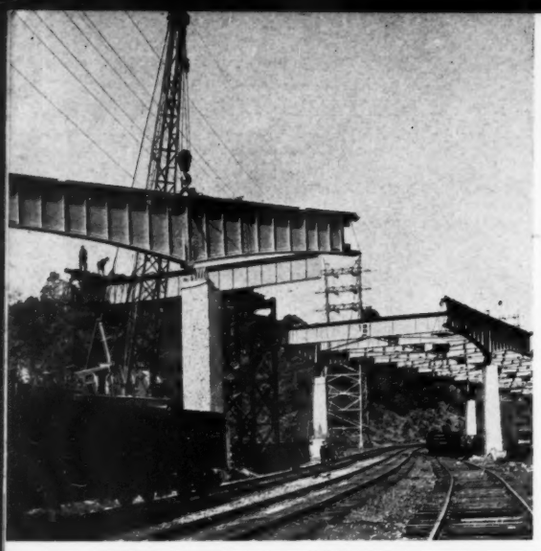
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 39.

Retractable Wheel-Chock

■ A wheel chock that is released by stepping on a trip handle is shown in literature from the Calumet Steel Castings Corp., 1610 Summer St., Hammond, Ind. The Casteel retractable chock is said to release instantly, no matter how tight it is wedged by the tire. The chock is made of cast alloy-steel with a tensile strength of 80,000 psi.

The folder illustrates how the chock can be used to increase efficiency and safety in loading, parking, and engaging trailers.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 118.



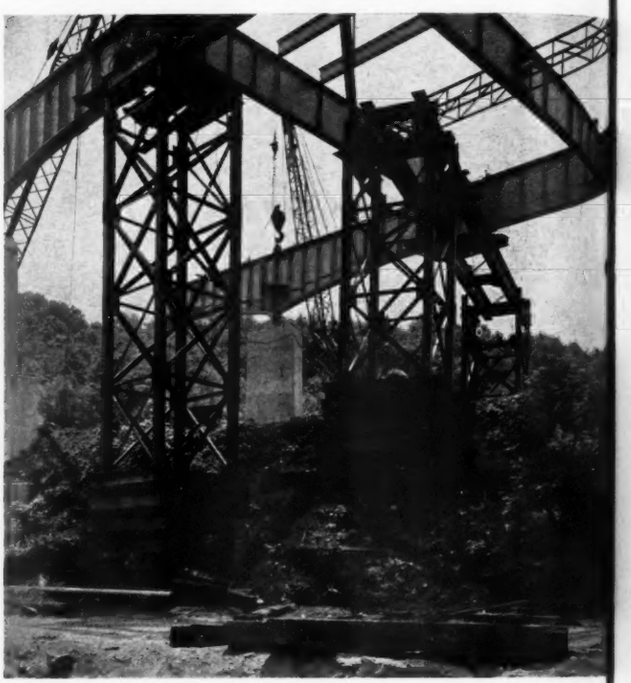
Overhead crane works under de-energized power lines as erection is coordinated with railroad traffic.

Coordination Speed

A HIGH MEASURE of teamwork helped solve some of the more pressing problems involved in building the Pencoyd Viaduct on the Schuylkill Expressway, an important access route connecting the present eastern terminal of the Pennsylvania Turnpike with the urban district of Philadelphia. The general contractor for the viaduct section is the Conduit & Foundation Corp., Philadelphia, Pa.

The turnpike now stretches almost across the entire 300-mile width of Pennsylvania. In the West, it reaches the Ohio border, 40 miles northwest of Pittsburgh. To the east, it ex-

Cribbing is required to support falsework bents on a railroad fill slope. The falsework at right spans the main tracks of the Reading Railroad.



...rection of Viaduct

Girders are raised into place on a section of the Pencoyd Viaduct by a Koehring crane.

tends slightly beyond historic Valley Forge. Eventually, it will connect with the New Jersey Turnpike south of Trenton, crossing the Delaware River by means of a new bridge.

Encounter Difficulties

One of the primary problems involved in the construction of the Schuylkill Expressway occurred at West Manayunk, where it crosses over two freight tracks of the Reading Railroad, plus two sidings near the Schuylkill River. Close coordination with railroad operations was of prime importance.

The erection staff of the Bethlehem Steel Co., Bethlehem, Pa., which had a subcontract to fabricate and erect the steel superstructure, maintained continual contact with the railroad authorities who, in turn, provided flag service to warn work crews of approaching trains.

Another difficulty was encountered overhead. Here, the erection staff arranged with the Philadelphia Electric Co. to de-energize daily the 66,000-volt main power line. The critical point on the wires was approximately 65 feet above ground near the west abutment of the viaduct. Erection equipment, which included a 75-ton locomotive crane and and 85-ton crawler crane, touched the de-energized wires on several occasions. Previously, the utility company had heightened one of the power-line towers to provide the minimum clearance requirement above the highway, the crown of which lies about 50 feet above ground at the highest point on the viaduct.

Another example of teamwork was the way the steel-shipping schedule conformed to the erection schedule. Almost all the structural members were delivered by rail from Bethlehem's fabricating works at Pottstown, Pa. By close coordination of the schedules, no storage space was required—the steel was unloaded when it was needed.

Steel-erection activities were also coordinated with busy earth-moving operations which went on simultaneously in the area.

Select Best Route

While construction of the turnpike was under the direction of a specially created Pennsylvania Turnpike Commission, the job of building access roads was handed to the state's Department of Highways. Thus, it was the department which was confronted with the delicate task of picking the least objectionable route for the Schuylkill Expressway through Philadelphia's Fairmount Park.

Selection of the rest of the route was not as difficult. Proceeding east from the turnpike's Valley Forge interchange, it passes through rolling farmland parallel to Gulph Road. From near West Conshohocken to Philadelphia's business center, the expressway generally borders the Schuylkill River. More than 17 miles long, the expressway is a four-lane concrete road consisting of two 28-foot roadways separated by a 4-foot center mall.

Structure of Viaduct

The Pencoyd Viaduct carries the expressway over valley country. It is an 11-span continuous-girder bridge, 1,483 feet long, supported on concrete piers and comprising 2,651 tons of structural steel. The heaviest

(Concluded on next page)

Coordination Speeds Erection of Viaduct

(Continued from preceding page)

girders are the haunch-type, used at the piers. They weigh 30 tons apiece, are 10 feet deep, and 60 feet long. The straight girders connecting the haunches are 80 feet long and seven feet deep.

Falsework was employed at ten locations to support the ends of the girders until adjoining pieces were connected to them. At one location, cribbing was required to support falsework bents on a railroad fill slope. Also, in erecting the south girder there, the falsework had to span the main rail line.

The viaduct roadway consists of a 4½-inch steel grid flooring filled with concrete to a 5-inch thickness. Underneath the roadway, where the viaduct crosses over the railroad tracks, blast plates were placed to protect the steel superstructure from the corroding blast of the few remaining steam locomotives passing underneath. The plates are ½ inch thick, 54 inches wide, and of lengths varying up to 20 feet.

The high point for earth-moving occurred ¼ mile west of the viaduct on the side of 200-foot Mt. Ararat. Here, 190,0000 cubic yards of rock were moved in 14 months. The cut was difficult because of the necessity of avoiding damage to a Philadelphia Electric transmission tower on top of the hill nearby; also, to avoid cave-ins 150 feet away along a 900-foot tunnel of the Reading Railroad. The tunnel, cut straight through rock in 1838, was an engineering marvel of its day.

Personnel

The expressway is being constructed under the direction of E. J. Kinney, district engineer of the Pennsylvania Department of Highways. W. R. Eccles is construction engineer for the viaduct section of the expressway. John R. Sloan is superintendent for Conduit & Foundation Corp.

The steel superstructure was fabricated and erected by Bethlehem Steel Co.'s eastern erection district, with G. P. Bullard, manager of erection. At the site, Tom Elder was field supervisor and Barney Epps was superintendent. Excavating subcontractor was the Talbott-Myers Construction Corp., Winchester, Ky., with Douglas Dillon as superintendent.

Universal Atlas Elects

Chester D. Rugen and Robert B. Jordan have been appointed assistant chief engineers for Universal Atlas Cement Co., a subsidiary of U. S. Steel Corp., 100 Park Ave., New York 17, N. Y.

Mr. Rugen joined the engineering department of Universal Atlas in 1930 and has been projects engineer since 1947.

The new boom for Gar Wood 75 Series excavators.

New Trench Hoe Boom

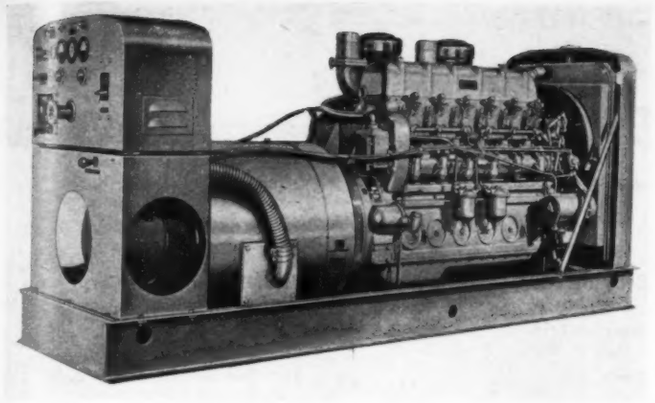
■ An optional heavy-duty trench hoe boom for the Gar Wood 75 Series excavators has been announced by Gar Wood Industries, Inc., Findlay Division, Findlay, Ohio.

Designed for excavation, cross-country pipe-line work, and other operations, the new boom weighs 8,500 pounds. It is removable for conversion to shovel, crane, dragline, clamshell, pile driver, and the foundation-borer attachments on the 75A, the heavy-duty 75B, and the 75BT truck crane.

For further information write to the company, or use the Request Card at page 18. Circle No. 155.

Butler Elected Director

Morgan R. Butler, Sr., has been elected a director of the Waukesha Motor Co., Waukesha, Wis. A former city engineer and mayor of Waukesha, Mr. Butler is president and treasurer of the Butler Bin Co., Waukesha, Wis., manufacturer of bulk materials-handling equipment for the construction industry.



The P&H Model 687C diesel-electric generator.

Line of Generators

■ A line of diesel-electric generating sets in capacities of 20 to 75 kw is announced by Harnischfeger Corp., Crystal Lake, Ill. The units are powered by the P&H 2-cycle diesel engines.

The generating sets come with four types of controls: emergency automatic, which takes over on full load the instant there is regular power source failure; semi-emergency automatic, which handles partial service upon failure; electric starting, which is controlled manually; and remote electric starting, which can be started from any of several distant points by push button.

Control switchboards are included with both ac and dc models.

For further information write to the company, or use the Request Card at page 18. Circle No. 53.

Hoist Converts Truck To 3-Way Dump Unit

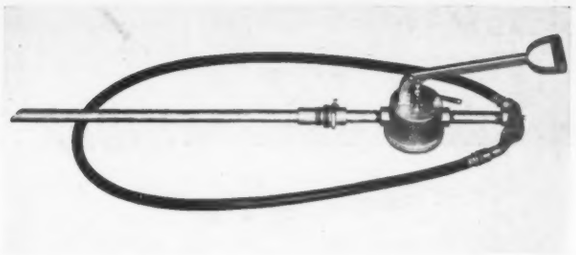
■ A new three-way hydraulic truck-hoist introduced by Norweld, Inc., Loveland, Colo., converts any 1½ or 2-ton truck into a dump truck that will dump to the right or left side and off the end. A simple alternative arrangement of pivot hinges enables the truck to be dumped in any of the three ways. Anchor pins placed in position on either side or at the end of the hoist frame let the heavy-duty twin hydraulic cylinders lift the truck bed to dump. The bed can also be locked for rough hauling of shifting loads.

The three-way hoist comes in a complete self-contained unit ready to be mounted directly on the truck bed. No welding to the frame is needed since the hoist is complete with structural steel stringers and under-bed reinforcing bolted to the bed and truck frame. The unit comes complete with a ball-bearing-mounted gear pump and cab controls.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 60.

Antoville Is Elected

S. W. Antoville, who started as an office boy 32 years ago, has been elected president of the U. S. Plywood Corp., 55 W. 44th St., New York 36, N. Y. Mr. Antoville, a vice president and director of the concern since 1937, replaces Laurence Ottinger. Mr. Ottinger, who founded the concern in 1919 and had been its only president, remains as chairman of the board of directors and chief executive officer.



Hand Pump for Liquids

■ A lightweight piston-type hand pump for handling solvents and petroleum products is announced by Ossian Engineering Co., Ossian, Ind.

The pump has a built-in strainer to insure clean liquids. The flow through the pump can be reversed by removing the pin that holds the shaft to the handle and then rotating the piston 180 degrees. The body is tapped with 1-inch inlet and outlet connections.

Capacity ranges up to 18 gpm at normal pumping speed. The pump is self-priming with a minimum dry vacuum of 10 inches. It is available in several models of both barrel and pedestal type.

For further information write to the company, or use the Request Card at page 18. Circle No. 154.

TRADING POST

CLASSIFIED ADVERTISING

An advertising inch in the Trading Post is measured ⅞-inch vertically on one column. Space reservations close in the New York office on the 10th of the month preceding publication. Send your classified copy to:

The Trading Post, Contractors & Engineers
470 Fourth Avenue, New York 16, N. Y.

INDEX TO ADVERTISERS

(Names in italics are advertising agencies)

Yours for the Asking

Further information or sales literature from any of the advertisers listed on these pages may be secured by using the post card bound in at page 18 of this magazine. Tell our Service Dept. what you want, and we will forward your requests immediately to the companies concerned.

Contractors & Engineers
470 Fourth Avenue
New York 16, N. Y.

Manufacturer Memos

Scott Joins Evans Co.

G. P. Scott has been made a full partner in the Robert G. Evans Co., 6315 Brookside Plaza, Kansas City 13, Mo. The year-old company will manufacture a full line of masonry and concrete saws, and diamond, abrasive, and reinforced safety blades, which will be sold under the trade name, Target. Exclusive distributor franchises are being established by the company throughout the United States and Canada.

Prior to joining the Evans Co., Mr. Scott was president of the Eveready Briksaw Co., of Chicago, for five years. He has also been vice president and general manager of the Standard Steel Works, North Kansas City, Mo.

Heil Division Names Row

H. J. Row has been appointed sales promotions manager of the Body and Hoist Division of The Heil Co., Milwaukee, Wis.

Mr. Row will act as coordinator on promotional matters between the division and Heil distributors around the country. His activities will be concerned with the medium-duty and heavy-duty single and double cylinder, twin-arm hydraulic hoists, garbage and refuse-collection bodies, and the new hydraulic tailgate, the Heiloader.

Chain Belt News

Chain Belt Co., Milwaukee, Wis., which has purchased the Shafer Bearing Corp., Downers Grove, Ill., will operate it as Shafer Bearing Division. The Shafer line of industrial roller bearings will supplement the Chain Belt line of sprocket chains. There will be no change in management for the newly acquired division.

Chain Belt has also purchased controlling interest in Crothers Engineering, Ltd., Toronto, Ontario, which will be operated as Canadian Chain Belt, Ltd. Officers are L. B. McKnight, president; O. W. Carpenter, vice president and treasurer; J. D. McNish, secretary; and Charles Barkworth, general manager.

The firm has also opened a new warehouse at 4125 Whitaker Ave., Philadelphia 24, Pa., to serve the New England and Middle Atlantic states. The warehouse will expedite shipments of Rex and Baldwin Rex sprocket chains, power transmission machinery, and allied products. The new facility will also house the company's Philadelphia district sales office, under William Sivyer, and a new Rex construction machinery district office, with Richard M. Leek in charge.

L. B. McKnight, Chain Belt Co.

Minneapolis-Moline Elects

Rex F. Jeide was named district sales manager for the Minneapolis-Moline Co., Minneapolis, Minn., succeeding Frank C. Hughes, who will be associated with the distributor sales division. In his new position, Mr. Jeide will promote the company's dealer and manufacturer account sales in his territory, which includes Minnesota, northwestern Wisconsin, Iowa, North and South Dakota, Montana, and Wyoming.

Mr. Jeide has had several years experience in the industrial product engineering department of Minneapolis-Moline and recently handled sales to manufacturers and governmental agencies.

Marietta Concrete News

The appointment of John R. Snowball as consulting engineer has been announced by The Marietta Concrete Corp., Marietta, Ohio. His duties will consist of calling on architects, engineers, contractors, and concrete products plants to provide them with information and assistance in the uses of lightweight aggregate, Beslite, and other Marietta concrete products.

Mr. Snowball has been associated with the Portland Cement Association since 1940 as housing and products engineer, structural engineer, and quality concrete lecturer for the PCA district office.

Highway Equipment Elects

John Miller has been appointed southeastern district manager for Highway Equipment Co., Inc., Cedar Rapids, Iowa, manufacturer of spreaders and bulk delivery equipment.

Mr. Miller, with headquarters in Atlanta, Ga., will cover the states of Arkansas, Louisiana, Tennessee, North and South Carolina, Georgia, Florida, Alabama, and Mississippi. He was with General Machinery Corp. before he joined Highway Equipment, and with Harnischfeger Corp. before that.

Carl R. Rolf, Pioneer vice president.

Pioneer Appoints Rolf

Carl R. Rolf has been appointed vice president in charge of sales by Pioneer Engineering Works, Minneapolis, Minn. He has held several positions in the firm's sales organization, including those of district sales representative for the western states, assistant sales manager, and assistant secretary and sales manager.

Prior to joining Pioneer, Mr. Rolf served as a Caterpillar dealer in Minot, N. Dak., and was factory and sales and service representative for the Russell Grader Co. from 1922 to 1929.

Gar Wood Appointments

Mark L. Shepard has been appointed manager of the Richmond Division of Gar Wood Industries, Inc., Richmond, Calif., succeeding J. B. Steed, who goes to Gar Wood's executive office, Wayne, Mich., for a new assignment.

Mr. Shepard has been chief engineer for another Gar Wood division, St. Paul Hydraulic Hoist, Minneapolis, Minn. He joined the division in 1936, and became chief engineer in 1947.

Melvin Staben has been appointed district manager of the northwest district for the Findlay Division of Gar Wood Industries, Wayne, Mich., manufacturer of power cranes and shovels, scrapers and bulldozers, ditchers, wideners, Finegraders, and spreaders.

Mr. Staben most recently served as district manager for the Industrial Division of the Oliver Corp. In his new position, he will cover the states of Washington, Oregon, Montana, Idaho, and Wyoming.

Westinghouse Gets V. P.

Alexander T. Daignault has joined Westinghouse Air Brake Co., Wilmerding, Pa., in the newly created office of vice president in charge of finance. He resigned as treasurer and a director of Dewey & Almy Chemical Co., Cambridge, Mass., where he worked for a period of seven years.

During World War II, he served in the Quartermaster General's office as assistant to the chief of the Research and Development branch. Prior to that, he was a member of the Industrial Engineering Department of United States Rubber Co. Mr. Daignault is a director of Baird Associates, Cambridge, and of the Control Engineering Corp., Norwood, Mass.

Stansfield for Goodrich

P. W. Stansfield was named manager of industrial tire sales for the Tire & Equipment Division of The B. F. Goodrich Co., Akron, Ohio. Mr. Stansfield joined B. F. Goodrich in 1936.

Leschen Appoints Dickson

Russell J. Dickson was appointed general sales manager of Leschen Wire Rope Division, H. K. Porter Co., Inc., St. Louis, Mo. Mr. Dickson will be in charge of the company's sales activities. He has been with Leschen for more than three years as Chicago district manager.

Nahin for Power Products

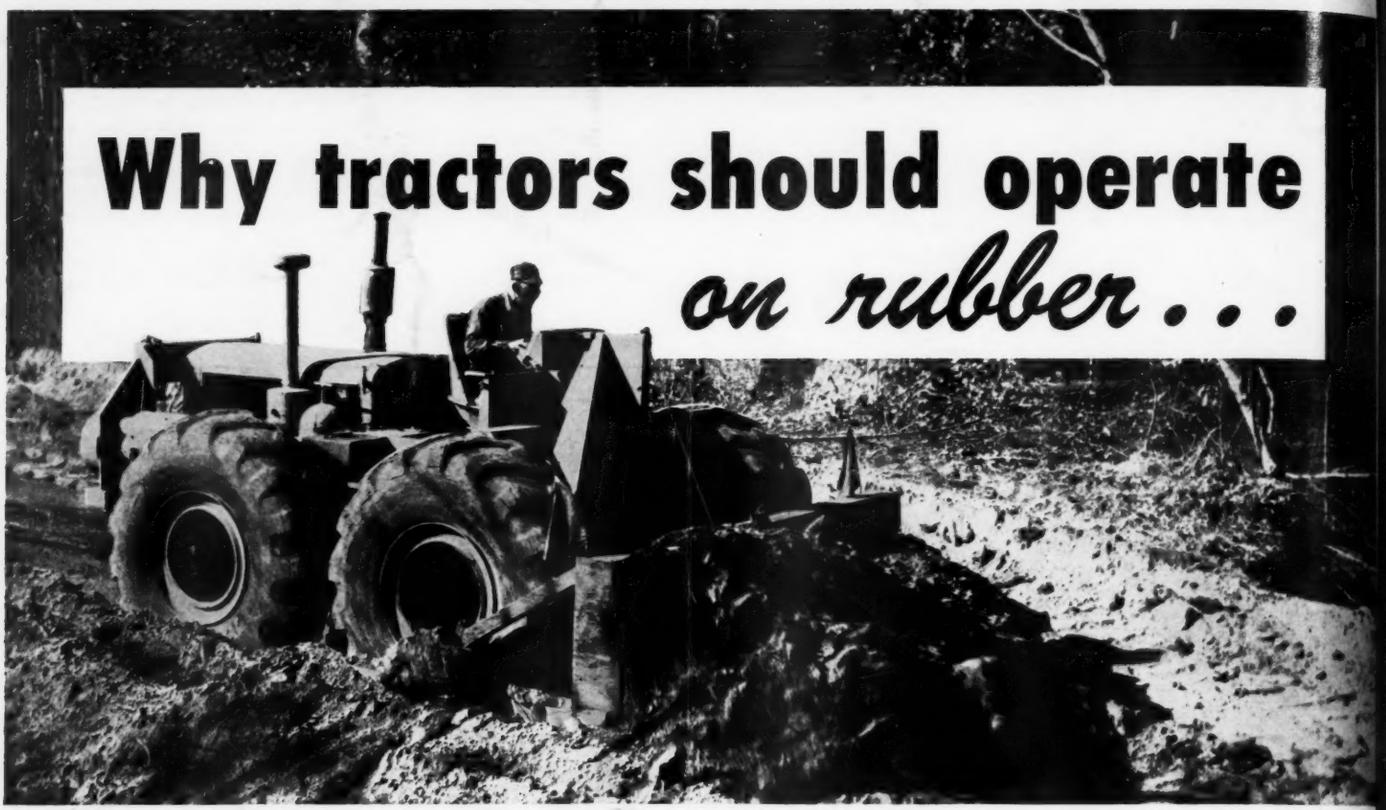
Power Products Corp., Grafton, Wis., manufacturer of lightweight two-cycle gasoline engines, has appointed W. L. Nahin sales manager. He will direct all service and advertising activities, in addition to relieving R. T. Lueloff, corporation president, of sales supervision.

Republic Rubber Appoints

J. A. MacIntire, Jr., has been appointed assistant manager of wire braid hose sales for the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, Ohio.

Mr. MacIntire was a salesman for the L. H. Gilmer Co., and spent 14 years with the Quaker Rubber Co. in several sales executive positions. In 1951, he joined the Production and Requirements Branch of the Rubber Division of the National Production Authority.

Why tractors should operate *on rubber . . .*



There's a difference in PERFORMANCE and COST

TOURNATRACTOR

drive through 4 rubber-tired wheels

1. Tournatractor's rubber-tired "go-anywhere" mobility, lets you travel over pavement, cross curbs, tracks without chamfering. Can be quickly dispatched to scattered jobs . . . operator just hops on and goes.
2. Free-rolling 19 mph speeds. Power travels on sealed anti-frictions from 186 hp engine to treads. Instantaneous gear change with constant-mesh transmission.
3. Travels on rubber-tired wheels as simple and maintenance free as those of a passenger car. Less wear, simplified lubrication, at few points.
4. Big low-pressure tires absorb shocks. Machine parts, as well as operator, ride smoothly over rough going. Tires flex for self-cleaning in gumbo.

CRAWLER TRACTOR

drive through 400 to 500 moving parts

1. Can't cross pavement, tracks, or curbs without planking. Must be trailer-hauled job-to-job. Loses working time waiting for truck, loading, blocking and unloading. Cuts down production, slows job progress.
2. More friction and drag. Slower forward and reverse speeds. Slow manual shifting with loss of vital momentum. Slow acceleration.
3. 400 to 500 wearing parts in tracks operate constantly in grinding dust and dirt. Require regular maintenance, replacement . . . time-consuming lubrication.
4. Rigid track assembly means constant jolting and shock load to parts, assemblies, and operator. Mud, dust fill assembly, slow cycle, wear out parts.

Before you buy any tractor, get all the facts on high-speed, rubber-tired Tournatractor. Write direct or contact your nearest LeTourneau-Westinghouse Distributor.

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS